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Screening for EIA in India: Enhancing effectiveness through ecological carrying capacity approach

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ABSTRACT

Developing countries across the world have embraced the policy of high economic growth as a means to reduce poverty. This economic growth largely based on industrial output is fast degrading the ecosystems, jeopardizing their long term sustainability. Environmental Impact Assessment (EIA) has long been recognized as a tool which can help in protecting the ecosystems and aid sustainable development. The Screening guidelines for EIA reflect the level of commitment the nation displays towards tightening its environmental protection system. The paper analyses the screening process for EIA in India and dissects the rationale behind the exclusions and thresholds set in the screening process. The screening process in India is compared with that of the European Union with the aim of understanding the extent of deviations from a screening approach in the context of better economic development. It is found that the Indian system excludes many activities from the purview of screening itself when compared to the EU. The constraints responsible for these exclusions are discussed and the shortcomings of the current command and control system of environmental management in India are also explained. It is suggested that an ecosystem carrying capacity based management system can provide significant inputs to enhance the effectiveness of EIA process from screening to monitoring.

1. Introduction

Around 110 low and middle income countries occupy about 75% of the world's land area and contain 93% of its population, but enjoy only about 19% of the world's 135 countries' gross domestic product (World Bank, 1997). Wood (2003) rightly pointed out that lack of improvement in EIA systems of developing nations will prove inadequate in terms of environmental protection at the global scale despite effective EIA systems in developed countries. The developing nations have also started some action in this regard as some 80 developing countries enacted some form of EIA legislation by the mid-1990s (World Bank, 1997; Glasson et al., 2005). However, the legal and institutional arrangements have not been made with a long term vision of sustainability. This shortcoming of EIA systems in most of the developing nations is being justified by citing their need to grow fast economically to be in a position to eliminate poverty and achieve the Millennium Development Goals (UN, 2005b).

The Screening guidelines for EIA reflect the first level of commitment the nation displays towards tightening its environmental protection system. This paper analyses the screening guidelines for EIA in India and dissects the rationale behind the exclusions and thresholds set in them. The screening process in India is compared with that of the EU EIA directive with the aim of understanding the extent of deviations from that of a screening philosophy in an economically developed scenario. Out of the exclusions from the EIA process in India the case of exemption for units inside industrial estates from the EIA process is analyzed in detail. The Tiruppur textile industry is highlighted for its positive and negative contributions and details about other similar cases are listed to show the extent of the problem. Finally the merits of ecological carrying capacity based environmental management are discussed along with its scope to improve the effectiveness of the EIA process from screening to monitoring.

2. Screening: significance in EIA

The process of screening can be defined as: "to determine whether or not a proposal should be subject to Environmental Impact Assessment (EIA), and if so, at what level of detail" (IAIA, 1999). Even though the above definition conveys the objective of

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the screening process in a simple and straightforward manner, the process of determining the same becomes complicated in a developing country. As this typically requires dedicated institutional capacity to carry out this task; time and resources from the project proponents; and imposes economic burden on small enterprises. EIA process at its best is expected to achieve the following: to protect the productivity and capacity of natural systems and the ecological processes which maintain their functions; and to promote development that is sustainable and optimizes resource use and management opportunities (IAIA, 1999). Although the stated objectives of every developing country is sustainable development (Earth Summit, 1997), in actual reality they are faced with complicated choices over conflicting tradeoffs primarily between the short term need to alleviate poverty and protection of environment for long term sustainability. Hence, the framing of screening guidelines assumes significance, as very stringent screening will hinder the economic growth of a nation and a liberal process or absence will result in inefficiency, wastage of resources and devastation of life-support systems (Jones, 1999; World Bank, 2002). Hence, the need for a rational screening process which even though need not stake out the exact mid point of the two probable scenarios outlined above, but has to tend towards a sustainable development strategy.

2.1. Approaches to screening

There are two fundamentally different approaches to EIA screening – (i) an environment centered approach, based on judgment of likely significant impact on environment from a proposal and (ii) a development-centered approach, based on the size and/or type of development. There is also a third option, being a hybrid of these two. Glasson et al. (2005) outlines the types of screening approaches as (i) thresholds approach and (ii) case-by-case screening approach. The thresholds approach adheres to the concept of a development approach where the thresholds are set in terms of size/capacity of projects and the case-by-case approach is an environment centered one where regardless of the size/capacity of proposals, every proposal is scrutinized for its impact on a specific environment. Lawrence (2003) details the screening approaches as being carried out in two stages such as determining (i) what should trigger an EIA requirement and (ii) which particular set of EIA requirements should be applied. Further, it is pointed out that these two screening steps normally focus on what (action), by whom (proponent) and where (the environment). Canter and Canty (1993) distinguish between screening based on policy delineation and that based on a preliminary study. Under screening based on policy delineation, further classification is made into project thresholds; sensitive area criteria; positive and negative lists.

An effective screening approach has to be a hybrid of the environment centered and development centered approaches. Because, though the environment in a certain location can be classified as sensitive, still certain benign green industries which can be located there needs to be listed for clarity and to avoid misuse or the other way the industries which should not be located can be specified. Such lists will remove the burden of case by case analysis on the screening authority and minimize the chance of ambiguity and corruption in decision making. Even in localities designated for location of all types of industries, only a certain quantity of pollutants can be safely assimilated by the various media (air, water and soil). Hence, a combined approach needs to be adopted to optimize the use of resources for effective screening. The details and the essential elements of such a combined approach are discussed in the forthcoming sections in the context of India.

2.1.1. Screening for EIA in India & the European Union

To evaluate a screening rationale compromised against the constraints of a developing nation, we need to analyze and compare it against a screening context free from most of those constraints. Hence, the screening guidelines of India are compared with that of the European Union with an aim to understand the extent of the deviations. The EU is characterized by high levels of literacy and per capita income than the developing world. High literacy levels ensure adequate environmental awareness and activism ensuring pressure on the authority to frame relevant legislation through adequate consultation with the stakeholders. High per capita income provides a country with resources to institute capacity aimed at environmental protection as indicated by the environmental kuznet's curve (UN, 2005a). The EU Directive is chosen for comparison as it can be considered to be free of the constraints faced by developing nations in general and India in particular. Moreover, the EU directive is a model legislation which needs to be emulated by the member nations and, hence, a better model to compare than the legislation of any country which invariably might be compromised by its prevailing socio-political regime.

In the EU, Environmental assessment is considered to be "a procedure that ensures that the environmental implications of decisions are taken into account before the decisions are made" (EU, 2005) and screening as "the process of determining whether or not EIA is required for a particular project" (European Commission, 2001). The screening requirement as per the EU Directives 85/337/EEC and 97/11/EC can be summarized as follow:

(i) Category of projects listed in Annex I of the EU directive which is well recognized as having the potential to affect the environment have to undergo EIA irrespective of their attributes.
(ii) The projects which under certain circumstances like low production capacity, location and technology might have negligible impact on the environment are listed in Annex-II of the directive. Whether the above premise holds well or not, has to be decided on a case to case basis guided by the criteria listed in Annex-III of this directive.

Though currently there is wide variation on thresholds and/or criteria adopted by EU member states, as per the directive, no project or activity can be excluded outright and at the least every project is required to be reviewed on a case by case basis against the specified criteria (European Commission, 2001). Now let us look at the developmental context and the screening rationale followed in India.

2.1.2. India: the screening context

India has invested considerable effort in carrying out the universally accepted principles of Rio Declaration. In one of its 27 principles, the Rio Declaration calls for EIA to be undertaken for activities that are likely to have a significant adverse impact on the environment (UN, 1992). The detailed analysis of India's EIA system under EIA Notification 1994 is available in Paliwal (2006) and Rajaram and Das, 2006. The screening guidelines of EIA 1994 are first presented and then the current guidelines as per EIA 2006 are discussed to understand the evolution of screening. Under EIA 1994, screening guidelines were issued for four categories of activities: Industry, Mining, Thermal Power, River Valley & Hydroelectric and Infrastructure. For the complete EIA notifications refer MEF (1994). The question of what will be put inside the EIA net and what will not be, evolved on an exclusionary non-participatory platform (Dubey, 2004).

The main approach to screening was one of excluding certain categories of projects based on investment thresholds. Hence,

exclusions from EIA included industries in the small-scale sector (with an investment less than INR 10 million (Euro 0.2 million)), certain industrial projects with investment less than INR 1000 million (Euro 200 million). It can be presumed that SSIs were exempted for their role in poverty alleviation by employing unskilled labor in large numbers and other constraints which are discussed later in this paper. This provision of exclusions in EIA 1994 based on investments for both new and expansion projects had encouraged rampant 'salami slicing' by the project proponents to circumvent the EIA process in India (Kohli and Menon, 2005). Under this scenario, change towards the best practice screening was expected from EIA 2006 which is discussed next.

2.2. EIA Notification 2006: changes in screening requirement

The screening criteria for EIA Notification 2006 (EIA 2006 henceforth) were evolved by the MEF and though public comments were invited, only a select few of the interested groups were invited to express their opinion (Saldanha et al., 2007). The main change in the screening criteria of 2006 was the adoption of capacity based exclusions than the investment size of a project. Another key change is the division of projects into A and B categories based on capacity. The Ministry of Environment & Forests (MEF) deals only with category A projects and the State Environmental Impact Assessment Agency (SEIAA) under the State Pollution Control Boards (SPCB) screens the category B projects, classifies them into B1 and B2 (MEF, 2006). B1 projects require an EIA and B2 projects need only to submit information on Form-I (questionnaire requesting information on raw materials used, waste generated and environmental features of the location) along with an Environmental Management Plan (EMP) for emissions and effluents. Although these changes make the screening process similar to the Annex I & II projects of the EU directive, it has many deficiencies as detailed below.

2.2.1. Exclusions from screening in EIA Notification 2006: industries not listed in Schedule-I

The Annex I of EU EIA directive which list projects that have to carryout an EIA contains 22 types of projects with a total of 44 listings including the project sub-types. In comparison the Indian listing of category A projects in Schedule I of EIA 2006 contains 28 types of projects with a total of 34 including the sub-types. Further in comparison to 88 projects including sub-types in Annex-II of EU directive, there are only 34 projects including sub-types under category B in EIA 2006. This difference in the number of projects illustrates the extent of exclusions from the Indian EIA process. The projects listed in EU directive and excluded from Indian EIA are listed in Appendix 1.

The critical nature of this difference becomes clear when we consider the fact that owing to high population and an environment dependent majority, impacts considered negligible in EU will have a substantial effect on the environment and communities in India (refer Rajaram and Das, 2007 for detailed discussion). This would mean that the listing of activities for screening in developing nations such as India has to be much more comprehensive than that of the EU. Moreover, the criteria for screening category B projects for further classification into B1 and B2 have not been specified till date.

2.2.2. Capacity based exclusions of listed industries/projects

For many of the projects which are covered in EIA 2006, capacity thresholds have been specified below which they are excluded from the EIA requirement. These projects along with the exclusionary threshold/criteria are listed in Table 1. From the above listing it can be seen that all the excluded capacities have

Table 1
List of projects with exclusionary thresholds in EIA 2006

Ref no.	Type of Project	Capacity/Criteria
1a	Mining	<5 Ha
1c	Hydroelectric power plants	<25 MW
1d	Thermal power plants	
	Pet coke diesel and other fuels	<5 MW
3a	Non-toxic secondary metallurgical processing	<5000 ton/annum
4b	Coke oven plants	<25000 ton/annum
4d	Chlor-alkali (membrane tech)	inside industrial estates
4f	Leather/hide/skin processing	inside industrial estates
5e	Petrochemical based processing	inside industrial estates
5f	Synthetic organic chemicals	inside industrial estates
5j	Sugar industry	<5000 ton/day cane crushing capacity
7c	Industrial estates/EPZ/SEZ/Biotech parks/leather complexes	<500 Ha and not having any category A or B industry
7e	Ports & harbours	<10000 ton/annum of fish handling
7f	Highways	expansion for < 30 km
8a	Building & construction projects	<20000 sq.m.
8b	Townships and area development projects	<50 Ha & <150000 sqm

the potential to impact the environment if located in ecologically fragile areas and ecosystem dependent communities. The philosophy behind these exclusions might be the aim to lessen the burden on the proponents and authorities rather than effective environmental protection. It can be noticed that industrial estates have been given a major concession. It is obvious that this is aimed at encouraging industrial growth, but the track record of industrial estates in adhering to the environmental norms are very poor (Polluted Places, 2008; Greenpeace, 1999; Banerjee, 2003; Rajaram and Das, 2008a). Since the EIA 2006 does not list all industries with impact potential like the EU annex II, it is possible to setup an industrial estate of less than 500 Ha area (say 490 ha) comprising entirely of small-scale textile dyeing units without carrying out an EIA. Such industrial estates which are functioning presently have had significant negative impact in the environment as detailed in the next section.

3. Blanket exemption for certain industries in industrial estates – why and where it can lead?

Under EIA 1994, the Small Scale Industry (SSI) was an outright exemption from EIA and in EIA 2006 they are still given the concession if they are located inside industrial estates. The case of exclusion of SSI is taken up for further discussion and analysis mainly because of the impact they have had on the environment which can be reduced through their inclusion into the EIA system. The reasons put forward in India for concession to SSIs are as follow: small investors cannot spend for EIA studies; the quantity of pollutant release is small when compared to large factories; EIA and EC delays the process of setting up an industry; the negative impact on the environment is small when compared to the bigger positive impact of job creation; the impact of pollution is local and can be monitored by State Pollution Control Boards (SPCB); excluded SSIs can be put in industrial estates and facilitated through common effluent treatment plants (CETP) and industrial growth is the only way to achieve poverty alleviation.

The role of SSIs – which are similar in nature to certain extent to the TVIEs (Town & Village Industrial Enterprises) in China, Small and Medium Enterprises (SMEs) as they are termed in Europe and Small Businesses in US – in the economic growth in general and job creation in particular is well appreciated and

Governments have initiated special laws to consider their interests in environmental law and enforcement (Agarwal, 2001; ECOTEC, 2000; EPA, 2005). The impact of SSIs on the economy can be clearly understood when we consider that it provides immediate large scale employment to unskilled workforce, offering a method of ensuring a more equitable distribution of national income and facilitating an effective mobilization of resources of capital and skill which might otherwise remain unutilized (Gulati, 1996: pp1). In India the SSIs together with Micro and medium enterprises have a share of 40% in the industrial production and 33% of the total manufactured exports employing about 31 million people in 12.8 million enterprises. The labor intensity in this sector is estimated to be four times higher than larger enterprises (MoMSME, 2006). The World Bank and the International Finance Corporation (IFC) have been particularly active in promoting small-scale enterprises, setting up a separate department for them in 2000 and allotted USD1.5 billion toward their development in 2002 (Rajshri and Lanjouw, 2004). The environmental degradation associated with uncontrolled promotion of SSIs is also widely recognized (ECOTEC, 2000; Snigdha and Mitrab, 2005; Ogenis, 2001). The case of Tiruppur textile industry is presented in the next section to illustrate their positive economic impact and the ineffectiveness of the current strategies in controlling their negative impact on the environment.

3.1. Case study: The Tiruppur textile industry

3.1.1. The Tiruppur textile industry: economic contribution

Tiruppur, the leading cotton knitwear industrial cluster in South India, located in Tamil Nadu State has more than 9000 small-scale knitwear related units employing about 500,000 people. The export valued from Tiruppur during the year 2006–7 was about USD 2 billion (Samuel Raja, 2008).

3.1.2. Impact on Environment

The study by Appasamy and Nelliyat (2000) brought out the following facts about the environmental impacts in Tiruppur: 702 bleaching and dyeing units were functioning by 2000 and their water consumption was about 86 million litres per day (MLD). Despite the construction of individual and common effluent treatment plants at considerable cost, salts, mainly chloride, continue to be discharged unabated. Although each individual unit discharges only a small quantity of effluents, the combined discharge of more than 700 bleaching and dyeing units outstrip the assimilative capacity, causing damage to agriculture, fisheries, and local ground water in and around Tiruppur.

3.1.3. Judicial Intervention

The farmers got themselves organized and resorted to agitation and legal recourse demanding the judiciary to rectify the situation brought on by the failure of the Government. The judiciary promptly pulled up the SSIs for not heeding their earlier directions and ordered them to pay up the subscription fees for putting up a joint zero discharge effluent treatment plant within a deadline or face closure (Sridhar, 2005a). The 'Loss of Ecology Commission' a State Government Agency had asked the Tiruppur dyes union to pay INR 4 Crores (USD 0.83 million) of compensation, a figure contested by the farmers union as it works out to a meagre INR 240/hectare (Sridhar, 2005b). As of June 2009, the Tiruppur SSIs were lobbying the government to implement a 300 km effluent pipeline project estimated to cost INR 800 Crores to convey the effluent to the Bay of Bengal (BS, 2009).

3.2. Is Tiruppur an isolated case?: How industrial estates are Responding to central control

The environmental damage perpetuated by the textile industry in Tiruppur is not an isolated case as evident from the environmental damage in these industrial estates dominated by SSI clusters: Ankleshwar-Chemicals, Howrah-Foundries, Kanpur-Tanneries, Nandesari-Chemicals, Panipat-Chemicals, Ambur-Tanneries, etc. (Polluted Places, 2008; Greenpeace, 1999; Banerjee, 2003; Rajaram and Das, 2008a). For more details about other sites in India devastated by SSIs see Polluted Places (2008). In the light of the contributions and problems associated with the SSIs, how many and how much of the arguments put forward for their exclusion is valid? Is there any way to move forward and progress towards sustainable industrial growth and poverty alleviation without its attendant destruction of life-support systems? Can EIA play any role at all in this constraint ridden situation? To understand the reasons for this situation it is necessary to look at the overall framework of environmental management in India and the position occupied by screening for EIA in it.

4. The link between screening for EIA and general pollution control in India

The link between the environmental management of projects which are required to conduct an EIA and those that are exempted from an EIA is given in Fig. 1. The figure shows that, category A industries which are required to conduct an EIA as per EIA 2006 are dealt by the MEF for grant of environmental clearance and the SPCB is required to conduct the public hearing and forward the minutes along with the final EIS to MEF. Whereas category B industries go through the screening process by the SPCB and if these projects are categorized as B1 (EIA required) go through all the steps as a category A industry but at the state level with the SPCB being the sole clearance authority. The projects categorized as B2 (EIA not required) are required to submit an environmental management plan and apply for 'consent to establish (CTE)' under the Air and Water Acts. The SPCB scrutinizes the EMP and provides CTE with or without conditions. The construction of the project is started and when it is ready for commissioning, they need to apply to the SPCB for 'consent to operate (CTO)'. The SPCB verifies the implementation of the EMP and provides CTO with which the project can be commissioned.

4.1. Why EMP is inadequate for Unlisted industries

Industries which are exempted from conducting EIA studies are required to apply for CTE by filling up forms under The Water (Prevention and Control of Pollution) Act, 1974 and The Air (Prevention and Control of Pollution) Act, 1981 (MEF, 2010). These forms typically request information regarding the raw materials used, quantity of water consumed, wastes generated (air emissions, liquid effluents, solid/hazardous wastes) and the treatment scheme proposed for treatment and disposal of the wastes. The EMP typically consists of proposed treatment schemes for disposal of the contaminants in concentrations upto or below the allowable limit specified by the SPCBs. These limits of contaminants in India are collectively known as Minimum National Standards (MINAS). For example as per MINAS, liquid effluents with Bio-chemical Oxygen Demand of less than 30 mg/L (BOD<30 mg/L) can be discharged into water bodies, provided the other contaminants listed under MINAS also meet their limits. These uniform discharge standards such as MINAS are ineffective in controlling pollution of the environment as they do not consider the cumulative effect of high

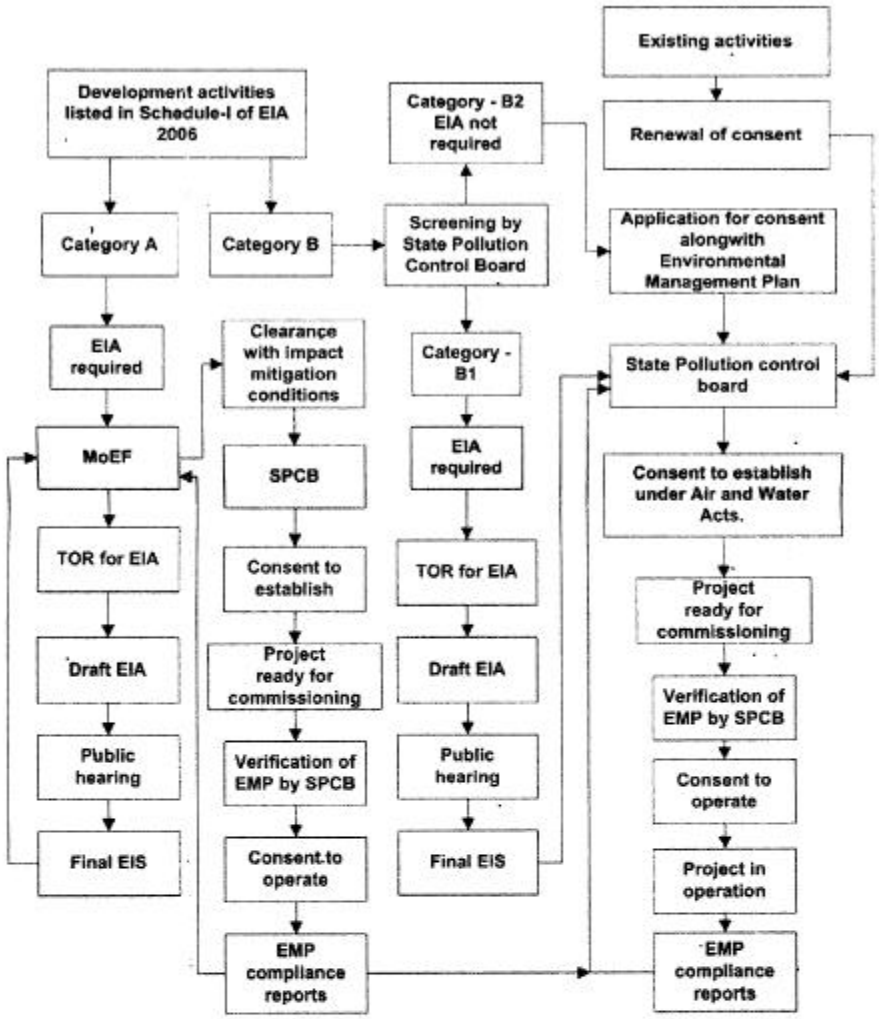

Fig. 1. Flow sheet of environmental management for projects requiring EIA and projects exempted from EIA.

volume of discharges from single or multiple sources. Hence, developed nations have already adopted ecosystem specific standards such as Total Maximum Daily Load (TMDL) (USEPA, 2008). The detailed discussion of the drawbacks of the MINAS under the Command and Control (CAC) system for control of Industrial effluents in India can be found in Rajaram and Das (2008a).

4.2. How cumulative impacts are ignored under mere environmental management plans (EMPs)

Exemption of industries from the EIA process under the premise that they can be taken care through the consent forms has not proved to be the right policy. Even industries conducting EIA studies still submit an EMP for liquid effluents and air emissions aimed at satisfying the MINAS and not the ecosystem specific impact mitigation plan. This compromises the effectiveness of the whole EIA system and reduces it to a mere form filling formality in India. When the consideration of direct impacts from activities is not mitigated through the EMP and its effective implementation and follow-up, consideration of cumulative impacts under the EMP remains elusive in India. But as calculating the cumulative impacts require data from multiple activities, it is the regulatory authority which is best placed to carryout the task than the proponent of a single activity.

5. Discussions: carrying capacity based clearances as an Alternative to Conventional project EIAs

The problem of how to bring all the industries including the SSIs into the EIA net can be solved if the constraints regarding access to expert knowledge and cost of conducting the study can be reduced and/or shared. Traditionally as per the EIA systems which evolved in the developed countries, the project proponents are responsible to carryout EIA at their expense. This cost which works out to be a fraction of the total investment for a large scale venture assumes a larger proportion for smaller ventures i.e. SSIs/SMEs. Hence,

instead of excluding the SSIs from conducting such studies, why should not the regulatory authority take the responsibility? The chronic problem of credibility of EIA studies conducted by the consultant-proponent nexus can be cured by shifting the responsibility of determining the significance of impacts to the regulatory authority with involvement of local public/NGOs. The model where the Government takes responsibility to carry out EIA and achieve its intended objectives (to protect the productivity and capacity of natural systems) by linking it with ecological carrying capacity of the area is proposed in Fig. 2.

This proposed model requires the following to be effective: detailed database of ecological processes and the functions they maintain, carrying capacity of the natural system in terms of its productivity and safe pollutant assimilation, linkages which the local populace has with ecological components and current status/trend of key resources in terms of its sustainability. The regulatory authority with the help of such information will be in a good position to judge the impact of any new activity on the sustainability of the local human–ecological interactions. Moreover, industries affect the environment mainly through extraction of resources (water chiefly), discharge of liquid effluents, and emission of air pollutants and disposal of solid/hazardous wastes. Other impacts in the case of SSIs are minor in comparison to large projects and are negligible when located in urban/industrial areas. Of the four main impacts outlined above, except solid/hazardous waste other impacts cannot be transferred to other ecosystems easily. And in terms of their effect on the local ecosystems, air emissions have the least impact when compared to other factors. This is a key factor in the unrestrained release of greenhouse gases which have impacted the global commons (atmosphere). Hence, extraction of resources and discharge of water pollutants which have a cumulative impact on the local ecosystem have to be regulated based on the carrying capacity. The solid/hazardous waste needs to be integrated into the regional waste management plan and the air emissions have to be tied along with the national emissions target.

For any EIA system to be successful it should have an efficient monitoring programme to ensure that pre-project plans & promises are met consistently. It is important that the EMP from EIA is integrated properly into the EMS of the functioning project for it to be effective (Bailey, 1997; Morrison-Saunders and Bailey, 1999). In resource scarce developing nations, this cannot be achieved by SPCBs alone without the participation of local community. Industrial pollution reduction through informal regulation by community pressure has been recognized as being influential (Schumacher, 1989; Blackman and Bannister, 1996; Goldar and Banerjee, 2004). The local community in many parts of the world which is primarily dependent on the ecosystems through agriculture and/or hunting-gathering have a wealth of knowledge about their environment. This ability to read local ecological processes mainly developed through experience and passed on through generations by their instincts to just survive. The model of community based resource management which is popular in the area of forest management (Nayak and Berkes, 2008) needs to be replicated in other ecosystems as well. Hence, we have to institutionalise their role as partners in managing our ecosystems with proper consideration and utilization of traditional ecological knowledge for fixing criteria and indicators of ecosystem health apart from the use of resource intensive scientific models (Rajaram and Das, 2008b).

Further, the Government needs to strengthen its SPCBs in terms of manpower and infrastructure as more investment is likely in future in the dirty sectors of chemicals, pesticides, and every imaginable industry with high pollution potential. The cost of carrying out all these studies need not be borne fully out of public funds. Instead, the total cost can be divided among the SMEs which will definitely be lesser than the cumulative cost when the SMEs conduct them individually and can also be collected in monthly or quarterly instalments much like the yearly fees for license under the Water and Air Acts collected from them at present. Funds spent on such ventures are justified when we consider the fact that annually ecosystem degradation in India is estimated to be around 10% of GDP or around USD 70 billion (Pachauri, 2004) (based on GDP of USD 688.7 billion in 2004 (World Bank, 2005)) which is the loss of capital asset and much of it irreversible for a long time.

From the proposed Environmental clearance procedure the regulating authorities with the help of local participation can keep account of every effluent outlet and control the industrial development of any area inline with its carrying capacity as staying within source and sink capacity is primary to achieve sustainable development (Sadler, 1996, pp. 209). Of course SMEs approved through this system can still go on to release untreated effluents, but monitoring and control through local public participation can avoid the repeat of Tiruppur like situations in future and promote pro-poor growth of SMEs which ultimately will lead to alleviation of poverty, the important of Millennium Development Goals. The cost of developing local ecosystem databases, conducting EIA and carrying capacity studies can be further reduced by involving NGOs, research institutes and local universities and can be made more significant and participatory by incorporating Local Ecological

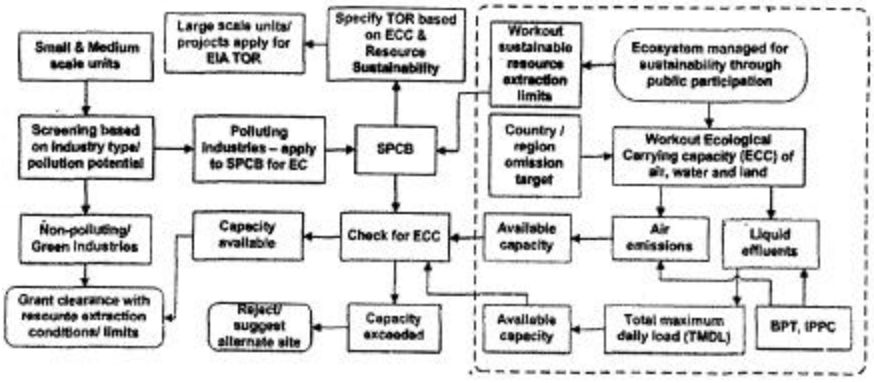

Fig. 2. Modified Environmental Clearance & Monitoring Process based on Ecological Carrying Capacity.

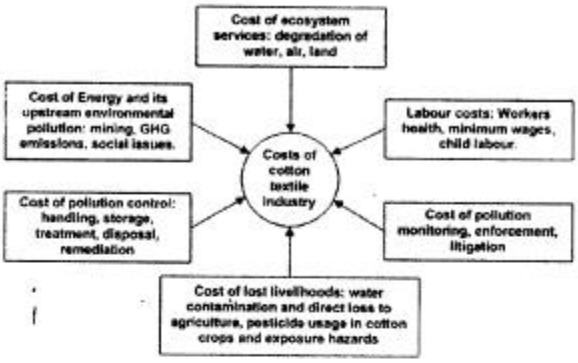

Fig. 3. Costs of Textile Industry which are to be internalised.

Knowledge (LEK). This approach will definitely lead to a much effective system of environmental conservation and management as an informed citizenry is recognized of having the ability to reduce environmental disasters (Skanavis et al., 2005).

5.1. Economic growth Led poverty alleviation at what cost?

The task of designing environmental management systems cannot be undertaken blindly to fulfil the requirements of economic growth without scrutinizing the actual need/attendant effects of unrestrained economic growth. Globally it has become very clear that liberalised economic growth aimed at creating wealth which is expected to trickle down to the poor is not happening but is increasing poverty and inequality (Stiglitz, 2002). Further it is the poor who suffer most due to ecosystem degradation (Millennium report, 2005) which in the case of Tiruppur SSIs has been the result of externalizing the cost of economic production & export of textiles. To arrive at the true cost of production of textiles in this case, we need to account for the various components of cost of ecosystem damage into the cost of textiles manufactured which is presently borne collectively by the society as shown in Fig. 3. According to a World Bank study, between 1975 and 1995, as India's GDP doubled, industrial and vehicular pollution load went up between four and eight times respectively (Anon, 1999, pp 32). Deterioration in urban environment, increase in slum population, and in air, river, and water pollution has vastly affected the quality of life of the urban poor (Khurana, 2004, pp1).

The trend of relying on exports like textiles, pesticides, chemicals and other products which the developed world is willing to import (for the simple reason that the real cost of manufacturing them are unrecoverable and unjustifiable against the irreversible loss of life-support systems) is not sustainable in the long term. Hence, there is an urgent need for any society to adopt a zero tolerance policy when it comes to safeguarding its life-support systems for continued sustainable survival. But even pollution intensive Industrial manufacturing is very much required for satisfying any society's internal consumption, and to trade the surplus produced according to sustainable strategies in order to import goods and services which are locally unavailable.

Implementing sustainable strategies should begin through existing tools such as EIA and focus on making it effective. Sadler (1996, pp39) identifies three distinct review parameters as: procedural: – does the EA process conform to established provisions and principles?, substantive: – does the EA process achieve the objectives set, i.e., support well informed decision making and result in environmental protection? and transactive: – does the EA process deliver these outcome at least cost in the minimum time possible, i.e., is it effective and efficient?. The substantive objective of environmental protection can only come about through an EIA system with components from screening to monitoring strengthened to enable development which is environmentally sustainable. A supporting system such as an ecosystem carrying capacity based management system can provide significant inputs to enhance the effectiveness of EIA process from screening to monitoring.

6. Conclusions and Recommendations

The current screening regulation of EIA 2006 in India with its exclusions is off-line from a sustainable development strategy. A more logical inclusive approach along the lines of the EU directive should be adopted. The list of projects in category B needs to be expanded to include a number of projects clearly identified in Annex II of the EU EIA directive. Clear and transparent criteria for categorizing projects into B1 and B2, needs to be specified in EIA 2006. The SSIs/SMEs in industrial estates excluded from EIA system have polluted the ecosystems around industrial areas across the country threatening India's sustainability and need to be brought under the EIA system. The constraints of the SSIs can be alleviated by adopting the proposed EIA system based on ecological carrying capacity where their constraints are considered. The Project EIA system for industries needs to be integrated with SEA and carrying capacity studies with SPCBs and local institutions playing the central responsible role in pre-project EIA and post-clearance monitoring. The SPCBs in India need to be strengthened in terms of infrastructure and manpower to protect the environment against the increasing tide of polluting industries which will be setup in India in the coming years. Framework and methods to incorporate the local ecological knowledge of the local people must be developed and adopted in the EIA process to enable it to achieve its substantive purposes.

Appendix. Projects with impact potential not covered under EIA 2006 in comparison with EU directive.

Annex I (EIA Mandatory)	Annex II (EIA Discretionary)
7. (a) Construction of lines for long-distance railway traffic 11. Groundwater abstraction or artificial groundwater recharge schemes where the annual volume of water abstracted or recharged is equivalent to or exceeds 10 million cubic metres. 13. Waste-water treatment plants with a capacity exceeding 150 000 population equivalent as defined in Article 2 point (6) of Directive 91/271/EEC. 17. Installations for the intensive rearing of poultry or pigs with more than: (a) 85 000 places for broilers, 60 000 places for hens; (b) 3000 places for production pigs (over 30 kg); or (c) 900 places for sows. 20. Construction of overhead electrical power lines with a voltage of 220 kV or more and a length of more than 15 km.	

Appendix (*continued*)

Annex II (to be screened for EIA)

1. Agriculture, Silviculture and aquaculture (a) Projects for the restructuring of rural land holdings; (b) Projects for the use of uncultivated land or semi-natural areas for intensive agricultural purposes; (c) Water management projects for agriculture, including irrigation and land drainage projects; (d) Initial afforestation and deforestation for the purposes of conversion to another type of land use; (e) Intensive livestock installations (projects not included in Annex I); (f) Intensive fish farming; (g) Reclamation of land from the sea. *2. Extractive Industry* (a) Quarries, open-cast mining and peat extraction (projects not included in Annex I); (b) Underground mining; (c) Extraction of minerals by marine or fluvial dredging; (d) Deepdrillings, in particular: – geothermal drilling, -drilling for water supplies, with the exception of drillings for investigating the stability of the soil; *3. Energy Industry* (i) Installations for the harnessing of wind power for energy production (wind farms). *4. Production and processing of metals* (a) Installations for the production of pig iron or steel (primary or secondary fusion) including continuous casting; (b) Installations for the processing of ferrous metals: (i) hot-rolling mills; (ii) smitheries with hammers; (iii) application of protective fused metal coats; (c) Ferrous metal foundries; (d) Installations for the smelting, including the alloyage, of non-ferrous metals, excluding precious metals, including recovered products (refining, foundry casting, etc.); (e) Installations for surface treatment of metals and plastic materials using an electrolytic or chemical process; (f) Manufacture and assembly of motor vehicles and manufacture of motor-vehicle engines; (g) Shipyards; (h) Installations for the construction and repair of aircraft; (i) Manufacture of railway equipment; (j) Swaging by explosives; (k) Installations for the roasting and sintering of metallic ores. *5. Mineral Industry*

(d) Installations for the manufacture of glass including glass fibre; (e) Installations for smelting mineral substances including the production of mineral fibres; (f) Manufacture of ceramic products by burning, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain. *6. Chemical Industry (not included in Annex I)* (a) Treatment of intermediate products and production of chemicals; (b) Production of pesticides and pharmaceutical products, paint and varnishes, elastomers and peroxides; *7. Food Industry*

(a) Manufacture of vegetable and animal oils and fats; (b) Packing and canning of animal and vegetable products; (c) Manufacture of dairy products; (d) Brewing and malting; (e) Confectionery and syrup manufacture; (f) Installations for the slaughter of animals; (g) Industrial starch manufacturing installations; (h) Fish-meal and fish-oil factories; (i) Sugar factories. *8. Textile, Leather, wood and paper products* (a) Industrial plants for the production of paper and board (projects not included in Annex I); (b) Plants for the pretreatment (operations such as washing, bleaching, mercerization) or dyeing of fibres or textiles; (d) Cellulose-processing and production installations. *9. Rubber Industry* - Manufacture and treatment of elastomer-based products. *10. Infrastructure projects* (c) Construction of railways and intermodal transshipment facilities, and of intermodal terminals (projects not included in Annex I); (e) Construction of roads, harbours and port installations, including fishing harbours (projects not included in Annex I); (h) Tramways, elevated and underground railways, suspended lines or similar lines of a particular type, used exclusively or mainly for passenger transport; (k) Coastal work to combat erosion and maritime works capable of altering the coast through the construction, for example, of dykes, moles, jetties and other sea defence works, excluding the maintenance and reconstruction of such works; (l) Groundwater abstraction and artificial groundwater recharge schemes not included in Annex I; *11. Other projects* (a) Permanent racing and test tracks for motorized vehicles; (b) Installations for the disposal of waste (projects not included in Annex I); (c) Waste-water treatment plants (projects not included in Annex I); (d) Sludge-deposition sites; (e) Storage of scrap iron, including scrap vehicles; (f) Test benches for engines, turbines or reactors; (g) Installations for the manufacture of artificial mineral fibres; (h) Installations for the recovery or destruction of explosive substances; (i) Knackers' yards. *12. Tourism and leisure* (a) Ski-runs, ski-lifts and cable-cars and associated developments; (b) Marinas; (c) Holiday villages and hotel complexes outside urban areas and associated developments; (d) Permanent camp sites and caravan sites; (e) Theme parks. *13 – Any change or extension* of projects listed in Annex I or Annex II, already authorized, executed or in the process of being executed, which may have significant adverse effects on the environment; – Projects in Annex I, undertaken exclusively or mainly for the development and testing of new methods or products and not used for more than two years.

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