

Environmental Impact Assessment (EIA) towards Road Construction in Chhattisgarh state

Youwraj Singh Sahu, Dr. Santosh K Sar, Shweta Singh

Abstract— The roads and highway projects are lifeline of any country. They are also important for the building the nation and are mirror of country's development. However, most of these road and highway projects on account of their location, route alignment and associated activities are invariably accompanied by significant environmental and social impacts during different phases (viz., Pre-construction, Construction and Operational phase) of the project. The nature of these impacts could be either positive or negative depending upon their potential to favorably or adversely affect the surrounding environment and also the resident community. While favorably viewing the positive impacts on the environment and community, it is also imperative to develop an appropriate and sound Environmental Management Plan (EMP) and execute it on the field/impacted area of the project to minimize and mitigate various adverse environmental and social impacts by conducting "Public Consultation" including "Public Hearing" to include and incorporate views of various stakeholders into decision making process. The EIA (environmental impact assesment), ensures that various Acts, Rules and Regulations for preservation, conservation and management of the environment along with R & R (Resettlement & Rehabilitation) issue are appropriately taken care of in the suggested EMP. Recently, the role of EIA of Roads and Highways have become more important as Central Government is undertaking widening and upgrading of various National Highways throughout the country under the different phases of National Highway Development Programme (NHDP) [1]. The present paper briefly describes provisions and procedure for carrying out EIA for the Roads and highways along with the EMP for mitigating various negative environmental impacts during different phases of the project. In order study either its beneficial or harmful effect; evaluation of any project through EIA has become a must. The environment is threatened severely by so many problems, some of which are caused by the activities of Construction Projects (An Assessment of Environmental Impacts of Building Construction Projects) [2].

Manuscript received Jan 15, 2015

Youwraj Singh Sahu, Department of Environmental Science and Engineering, BIT, Durg, India

Dr. Santosh K Sar, Department of Environmental Science and Engineering, BIT, Durg, India

Shweta Singh, Department of Environmental Science and Engineering, BIT, Durg, India

I. INTRODUCTION

The inclusion of roads has been known to provide great social benefits to the poor, e.g. improving rapid and emergency access to hospitals, increasing the attendance of children in schools, etc. Roads have also been known to greatly stimulate agricultural production by providing access to markets, helping also in the transition from pure subsistence to market-oriented production. However, more recent evaluations have also shown the importance of roads in stimulating and expanding non-farm activities. This has been achieved within the context of area and rural development projects, where the inclusion of road components has helped to accelerate and enhance the production and consumption linkages within the concerned project areas, thus multiplying non-farm activities and employment opportunities for the poor. Environmental Impact Assessment or EIA as usually called can be considered as the appraisal of the probable impact that a proposed project may have on the natural environment [15].

The state of Chhattisgarh is being created out the state of Madhya Pradesh. The state is the 10th largest state of India. Government of Chhattisgarh has applied a loan through Government of India from the Asian Development Bank (ADB) for the Chhattisgarh State Roads Sector Development Project (CSRSDP) for the improvement of about 1539 kms state roads in Chhattisgarh. Public Works Department, Government of Chhattisgarh (PWDGoC) has been entrusted the implementation of CSRSDP. The improvement work consists of rehabilitation, strengthening and/or widening of the existing roads and cross drainage structures/bridges.

The district and state roads provide important linkage to the National Highways and serve as secondary system of road infrastructure in India as well as in the state of Chhattisgarh. Indian construction industry is rapidly growing at a rate of 9.2% as against the world average of 5.5 %.(Environmental Impact Assessment (EIA) and Construction). The present article reviews the various steps involved in present a socio-economic profile of the subproject area with particular reference to indigenus people, communicable diseases especially HIV/AIDS, human trafficking, poverty level, gender issues, local economy like agriculture, industry, health and educational status in accordance with Poverty and Social Analysis [3].

II. METHODOLOGY

Keeping in view of the objective of the PSA, the study was carried out with a participatory approach by involving the stakeholders, particularly the project beneficiaries and probable affected persons through a series of consultative process techniques. The population groups that were consulted include beneficiary group of people in the project

influence area, particularly the shopkeepers, farmers, transport operators, school teachers, Gram Panchayat Sarpanch/members, village elders, the local youth and the Govt. officials who are involved in rural and women development programs and employment generation schemes. Care was taken to form participatory consultative groups as homogenous as possible. The PRA techniques and tools were selected with the objective of getting as much information as possible so that project's impacts and benefits as well as present situation and constraints can be ascertained.

The methods adopted:

Focus group discussions were organized, in separate sessions, with groups like, youth/ elders, shop keepers/ operators, women & especially vulnerable people who were available during survey period on specific topics, such as, perceived benefits, present constraints, etc.

- Community consultation took place along major settlements near by the proposed alignment and those are likely to be connected as a result of implementation of this subproject. Meetings were held with the transport operators and road side Dhaba owners at a few important junctions near NH that are connected with the project road section. These meetings were of particular significance in respect to spread of HIV/AIDS, risk of trafficking in the project influence area.
- Key informant interviews were conducted with local leaders/ village Panchayat functionaries and members & Senior citizen of the area to gain an insider's views regarding specific highway related issues in the area. In some cases, interviews were undertaken at places convenient to the key persons, even beyond project impact zone.
- Gender Analysis was given proper emphasis during focus group discussion. For the purpose separate group discussion sessions were held with women who could share their experience related to transport issues that are specific for the women. Their collective perceptions about project impacts and probable benefits particularly for the women were taken note of.
- Structured direct observations: Field observations on general socio-economic and health status need of the people, infrastructural set up or lack of it, requirement of the people in view of project road alignment, etc. were noted by the survey team.
- Review of secondary information: Apart from aforementioned techniques and tools a desk review and preliminary analyses were undertaken of existing statistical records, census, and gazetteers. Published works, research reports, National Human Development reports, State women development cell reports, and periodic reviews were consulted to get an overview of the general gender, health, trafficking issues.

1) Identification of Project Impact Zone

The road users and the population benefited / affected by the project roads are mainly the persons, who generally pass through or use the existing road / proposed alignment for their daily needs. The majority of the direct beneficiaries of the

project reside in the vicinity of the road alignment, within approximately 5 km radius from the road alignment. Only non-motorized vehicles and pedestrian traffic have been considered in terms of easy accessibility to the project road, as the feeder roads from the villages connecting the project road sections / proposed alignment are mainly earthen or brick soled and villagers either walk to the destinations or use manually / animal driven vehicles for transport.

Project impact area (PIA) has been identified as a 10-km band, that is, a width of 5 km on either side of the existing alignment of project road section. FGDs were conducted in selected clusters spread over the PIA.

2) Selection of Clusters for Socio-Economic Study

The majority of the potentially affected / benefited persons living in the project influence zone frequently travel down the existing roads or proposed alignment of the subprojects. Their purpose of visit brings them generally to the prominent market places by the road side or transport boarding points alongside the road. Other beneficiaries also pass through the important junctions of the feeder roads connecting the project roads / proposed alignment. These junction points served as the clusters from where sample households and FGD meetings were selected.

Besides, Gram Panchayat offices, places of worship, community structures in the major settlements within the project impact zone were also taken into considerations for holding FGD/ Key Informant Interview (KII).

The Project Influence Area (PIA) is located in the districts of Rajnandgaon and Durg. The table 1.2 provides details of the sample subproject road section.

3) Method for Data Collection

The Small Business Enterprises (SBE) in the markets, in the close vicinity to the road, is mainly operated by the villagers of the PIA. The owners, tenants, employers and customers of the roadside SBEs have their residences scattered all over the PIA. Hence roadside SBEs were preferred over the roadside residences for selecting the sample, since occupiers of residences along road do not necessarily represent the population over entire PIA.

To portray the key element of social assessment of the people concerned, Focus Group discussions were conducted in important locations / congested market places covering all the area within PIA. The Key Informant Interviews (KII) was carried out with village elders, eminent persons of the localities and Govt. officials and people's representatives from Gram Panchayat.

2.1 Proposed Project and Its Perceived / Anticipated Benefits

During Key Informant Interviews (KII) and focus group discussion (FGD) sessions it was obvious that people in general had some preliminary knowledge about proposed improvement programmed of the road. People are eager about the subproject which they feel will solve many of their long time constraints regarding accessibility. Parts of the project influence area gets inundated occasionally which causes suffering to the common people, besides damaging the infrastructures including road network. Execution of the proposed subproject is also relevant towards overall growth of the area. The perceived benefits of the proposed road section as expressed by the people are noted below.

1. Better connectivity leading to livelihood prospect

With the completion of the project, NH would be connected with the project influence area, particularly the interior villages. There will be a flow of traffic throughout day and night and also round the year. It would increase the business prospects of the shops and eateries / road side *Dhabas*. This will enhance the livelihood opportunities of the business owners / operators and help increase in income. Both Rajnandgaon and Durg, the districts Head Quarters would be easily accessible from the entire project impact area. Marketing of the agricultural production would be done with ease. The speedy transport system of the subproject will boost their economy immensely. The poor families consider the subproject as an opening of job opportunity and better wage rate. Besides, they are enthusiastic about possibility of engagement in road construction work near their home, thus minimizing necessity of migration.

2. Better road maintenance

During rainy season the road remains stagnated under water which erodes road's black top easily and creates lot of potholes. Lack of maintenance aggravates worsening road condition which increases the journey time and hassles. The people think that as the proposed road will be made with huge investment the Government would try to maintain this road properly, which may involve more infrastructural investment and bring overall development to the place.

3. Reduction in travel time and cost

Proper transport facilities would decrease the travel time and cost. It is also expected that the subsidiary link roads from the SH 5 would be developed later to cater to the needs of interior villages more effectively. The transport operators consider to reap economic benefit as well built and maintained road will enable them reduce vehicle operating cost (VOC) and journey time. Those engaged in service and trade & business are most positive about lesser hardship and reduced time & cost of travel once connectivity is established. Besides, with improved road condition more public transport system including Govt. bus service are likely to be introduced and the auto and trekker services will also improve.

4. Better road safety

The people envisage that with implementation of the proposed subproject frequency of accidents in this area will decrease and mobility of the people, especially the women, will increase. They expect that while improving the road geometry & design special attention on accident prone zones and congested locations will be given.

5. Infrastructural facilities

The project influence area does not have proper health care facilities. The women were of opinion that properly equipped PHC/rural hospital with qualified doctors should be established here to take care of the pre-natal and post -natal complications. With better mode of transport doctors will be able to reach the PHCs and rural hospitals located in interior area without much difficulty. This will be a boon for the sick, elderly people and the pregnant women. The maternal mortality and child mortality rate would decrease.

The young women feel that higher education and technical education would be easily accessible for them with improved mode of transport which will reduce travel time and cost to

district head quarters. They also feel that the social status and economic prospect for the young generation would increase.

III. ECONOMIC PROFILE OF THE PROJECT INFLUENCE AREA

1) Income Level

The level of household income among the sample families within the PIA illustrates that 70 per cent of the families have an income ranging from Rs.12001 to Rs.60,000 a year corresponding to an income level of Rs.1001 - Rs. 5000 a month. Households earning above Rs 5000 a month or Rs.60, 000 a year, account for 20 percent. However, 5 per cent of the households are found to be quite poor with monthly income less than Rs.1000 a month. The number of BPL¹ families accounts for a significant proportion, 25% of the population in the PIA. The proposed subproject by way of improving the existing road condition will also increase accessibility to far away probable places of working opportunity, like the district head quarter and other important cities. This will facilitate growth of more economic activities, access to better economic prospect outside the area and hence increase in income generation. This will be particularly effective for the poor families

2) Gender ratio in Earning Population

Percentage of working population above 18 years of age is 30% of all population. The share of women workers in the PIA is only 20% of total workers. This may be due to "invisibility" of women in work force which is more common in rural Hindu society where women do not normally work outside home. However, women of agricultural households are involved in numerous farming operations which are not usually reported during enumeration and thereby proportion of women work force towards gainful employment remains insignificant.

3) Land Holding

The PIA households have been categorized into various classes by land holding status. The majority of the sample households (90 percent) have legal rights over their land holdings. Remaining 10 per cent households do not own land but have built structure on others' land either for living or for carrying out livelihood from those structures. Only five per cent are owners of business structures only. The number of landless agricultural labour and share-croppers is also very low, only two per cent, while 8 per cent families are tenants and others. The PIA is largely an industrial and agricultural area where heavy industries and cultivation are the mainstay since generations.

So far as land holding size is concerned the about 20% of the PIA households possess marginal holding up to 1 acre between 1 acre and up to 2.5 acre is about 25% above 2.5 acre up to 1 hectare is 20%. Another 25% families have holding more than 1 hectare of land. A meager 10% has land holding more than 5 acre. The most striking feature is that about 10% of the families in the study area are landless. The phenomenon of small land holding size below 1 acre is mainly due to land fragmentation as a result of division of family resulting in to individual ownership from joint ownership by smaller units.

¹ BPL = Below Poverty Level, as per state level survey conducted to identify families below poverty line and eligible for Govt. poverty alleviation schemes.

They are either agricultural labour / sharecropper or owners of structures built on others' land and tenants.

4) Assets & durables possessed

Apart from land-related assets within PIA, the households also possess various other types of moveable assets, including vehicles, agricultural implements and livestock. Survey showed that motorized vehicles, namely, motor cycles and scooters are owned by 60% households for use of personal transport and business. Almost one-fourth of the sample households also possess livestock. While 80% households have electronic items like cell phones and radios, there are 15% families who own luxury items.

5) Vulnerability

There are various types of vulnerable households accounting for 50%. The largest share of these is the BPL population with 25%. The families having disabled members are 3%. There are negligible numbers of families headed by women. Scheduled Caste households account for 10%. About 20% of the Scheduled Tribe family who are not BPL has been recorded among the households.

6) Poverty Analysis

Defining poverty and identification of indicators of poverty has been a matter of debate for a long period. A daily per capita consumption of 2,100 calories in urban areas and 2,400 calories for rural areas used to be considered as the requisite benchmark to fall in the BPL category. Accordingly, annual income of Rs.20000 for household of five persons was fixed as the upper limit of Below Poverty line in 1997. The National Planning Commission, who is responsible for estimate of people living below poverty line, has currently estimated that a monthly per capita income of Rs.356 in rural areas and Rs.539 in urban areas is needed to afford the required diet.² Since 2002 the definition of BPL category has undergone a change with 12 additional parameters, such as, landholding, type of dwelling, clothing, food security, ownership of assets & durables, educational status, working status, sources of livelihood, education of children, indebtedness, migration and vulnerability.³ Each of these indicators has a 5-point score value by which the families are assessed for their relative deprivation. A total of 30 score points for all the parameters taken together is considered as the cutoff point and a family assigned 30 scores or less is included in the list of BPL category. By this method latest estimate of number of people living below poverty line in India is a whopping 37.2 per cent as against 26.1 per cent in 2004-05.

A survey of BPL families under these revised criteria is in progress for all the districts and blocks over Chhattisgarh and database of the BPL families are yet to be finalized and made available for consultation. In the absence of such BPL list for the concerned Blocks in the PIA, assessment of BPL families among the surveyed households was based on upper limit of annual household income of Rs 20,000. About 25% of the households were identified as belonging to BPL category. Further analysis of these BPL households revealed that 15% of the total BPL families live in an extremely poor condition as landless agricultural labourer with an income of less than

Rs.1000 a month. In addition, 33% of BPL families are marginal farmers. There are nearly 25% of all BPL families whose main source of earning is non-agricultural casual labour.

7) Access to credit

There is a high level of indebtedness among the sample population as revealed by the fact that 40% of the households have taken credit during current period. About one-fourth of population has taken loan either from Private Money Lenders. Despite a reasonably educated population in the PIA highest proportion of families have taken loan from the Bank/ Financial Institution (10%). Only 3% of the sample families have availed of credit facility from government funding agencies. It is evident that the PIA is within accessible reach of a well developed physical infrastructure zone centered on the district towns and district head quarters. But people are reluctant to fall back on Govt. funding agency.

8) Migration Pattern

Annual migration is not a common phenomenon in Chhattisgarh, particularly in rural areas. It is a well known fact that livelihood of poor families often depends on forced migration to urban areas and even beyond state boundary. However, the PIA did not record any significant impact of migration during the period 2010- 2011 as revealed by the survey. In migration was very common before two decades as large scale mining industries in the state attracted labourers from all over the country.

It is expected that the proposed improvement work of project road will open up prospect for the local people and there will be better road connectivity to venture to areas within accessible distance for livelihood.

Health Issues

During FGD sessions the villagers mentioned of water borne diseases like, diarrhea, dysentery, during rainy season, when water logging causes scarcity in safe drinking water from tube wells. Some low lying areas that sometimes are submerged during flood for a period from one to even three months suffer from acute shortage of drinking water.

Social Impact Assessment

The EA will undertake a social impact assessment (SIA). The SIA will gather relevant information on demographic data; social, cultural and economic situation; and social, cultural and economic impacts both positive and negative on the tribal communities in the subproject area.

Information will be gathered from separate group meetings within the tribal community, including tribal leaders; group of tribal men and women, especially those who live in the zone of influence of the proposed subproject under the Project. Discussions will focus on the positive and negative impacts of the subproject as well as recommendations on the design of the subproject. The EA will be responsible for analyzing the SIA and based on it developing an action plan with the tribal community leaders. If the SIA indicates that the potential impact of the proposed Project will be significantly adverse threatening the cultural practices and their source of livelihood, the EA will consider other design options to minimize such adverse impacts and will prepare an IPP.

² The estimate is derived from the National Sample Survey, which measures monthly per capita consumer expense every five years.

³ Source: The statement of the Union Minister for Rural Development, Government of India in Rajya Sabha on 21st March 2006.

9) National Rehabilitation & Resettlement Policy, 2007(NRRP-2007)

The National Rehabilitation and Resettlement Policy, 2007 (NRRP-2007) was adopted by the Government of India in 31st October, 2007 to address development-induced resettlement issues. The policy provides for the basic minimum requirements, and all projects leading to involuntary displacement of people must address the rehabilitation and resettlement issues comprehensively. The State Governments, Public Sector Undertakings or agencies, and other requiring bodies shall be at liberty to put in place greater benefit levels than those prescribed in the NRRP-2007. The principles of this policy may also apply to the rehabilitation and resettlement of persons involuntarily displaced permanently due to any other reason. The objectives of the National Rehabilitation and Resettlement Policy are as follows:

- to minimize displacement and to promote, as far as possible, non-displacing or least displacing alternatives;
- to ensure adequate rehabilitation package and expeditious implementation of the rehabilitation process with the active participation of the affected families;
- to ensure that special care is taken for protecting the rights of the weaker sections of society, especially members of the Scheduled Castes and Scheduled Tribes, and to create obligations on the State for their treatment with concern and sensitivity;
- to provide a better standard of living, making concerted efforts for providing sustainable income to the affected families;
- to integrate rehabilitation concerns into the development planning and implementation process; and
- Where displacement is on account of land acquisition, to facilitate harmonious relationship between the requiring body and affected families through mutual cooperation.

The Policy essentially addresses the need to provide succor to the asset less rural poor, support the rehabilitation efforts of the resource poor sections, namely, small and marginal farmers, SCs/STs and women who have been displaced. Besides, it seeks to provide a broad canvas for an effective dialogue between the Project Affected Families and the Administration for Resettlement & Rehabilitation. Such a dialogue is expected to enable timely completion of projects with a sense of definiteness as regards costs and adequate attention to the needs of the displaced persons especially the resource poor sections. The intention is to impart greater flexibility for interaction and negotiation so that the resultant Package gains all-round acceptability in the shape of a workable instrument providing satisfaction to all stakeholders/ requiring bodies.

R&R Benefits for Project Affected Families

National Policy of "Resettlement and Rehabilitation for Project Affected Families" document outlines broad guidelines with respect to the rehabilitation and resettlement for various projects, and Para 6.17 of the policy mentions "Acquisition of Long Stretches of Land: In case of projects relating to Railway Lines, Highways, Transmission Lines and

laying pipelines wherein only a narrow stretch of land extending over several kilometers is being acquired, the Project Affected Families will be offered an ex-gratia amount of Rs.20,000/- per family, and no other Resettlement & Rehabilitation benefits shall be available to them."

IV. CHAPTER 11: HIV/AIDS & HUMAN TRAFFICKING RISKS

1. HIV/AIDS awareness in the (project influence area) PIA

To combat HIV/AIDS is one of the UN Millennium Development Goals, which promises to halt spread of HIV/AIDS by 2015. As per NACO statistics, the revised estimates of the number of persons living with HIV in India is 2.31 million in 2007, with an estimated adult HIV prevalence of 0.34%. HIV Sentinel Surveillance – 2007 did not include state of Chhattisgarh as one of the prevalent area for HIV/AIDS. Human trafficking, on the other hand, is a fast growing transnational crime. The trafficking includes sexual exploitation as well as domestic servitude, forced agricultural labour, sweatshop labour, at construction or dhaba. The participants at FGD have apprehension of certain risks regarding HIV/AIDS and trafficking which are likely to penetrate the area during construction. They pointed out that the project when implemented will bring PIA closer to large road network and there will be more intrusion of HIV affected persons or agents of trafficking racket that is spread across the country.

2. Proposed Mitigation measures

After detailed discussion on the HIV/AIDS issues the stakeholders wanted certain measures to be taken by the Govt. and the community at large to address the issues which are looming.

During project implementation there should be proper awareness campaign at the civil construction sites.

Appropriate IEC materials in local language & in picture to be displayed and distributed.

Police and Block officials to take more active role to apprehend any remote chance of trafficking.

NGOs should be invited to make people, particularly the poor families frequently migrating to far off areas, aware of the risks of HIV/AIDS.

CONCLUSION

The social impact assessment of the project road with the help of sample socioeconomic survey and focus group discussion, along with key informant interviews carried over project influence area (PIA) has been presented in the foregoing chapters. Major findings of the study along with people's perception, opinion and concerns regarding the proposed project and some recommendations put forward by the people during FGD sessions are as follows.

1. Major findings

The PIA is characterized by a predominantly rural population where Caste Hindus predominate followed by Schedule Tribe population. The sex ratio of 982 females out of 1000 males in Durg and 1023 in Rajnandgaon are above national average of 933. The working age group (15-59 years) forms majority of population, but child population was alarmingly low. The majority of the families are either nuclear or joint families. Average household size varied from 4-6 members.

The proportion of literate persons is 80%. There is also a high degree of school enrollment, 95%, including the girl children. Primary activities engage 75% of work force, while cultivation alone accounts for 55%. About 15% of the working population is engaged in Trade and Business

2. People's perception, opinion and concern about the project:

Access to higher educational institutions and health care facilities is very limited due to improper connectivity although the area is closely situated by the national highway network.

As expressed by the people, the area is lacking connectivity to major cities, including Durg and Ranjnandangaon and highway network, which is essential for full utilization of the resources of the area. The proposed project will fulfill that necessity and the area will develop to its potential.

The community has expressed some concern about road safety particularly at busy junctions along the road. Better road will induce higher speed and may cause frequent accidents than before.

3. Recommendations

- While designing the road for improvement accident prone zones and congested & sensitive locations, e.g. school, PHCs, markets etc should be kept in mind and there should be proper traffic signs, speed breaker & other safety signs at vulnerable points.
- Introduction of govt. Bus Service is a major demand for lower fare. Proper transport facilities would decrease the travel time and cost. It is also suggested that the subsidiary link roads from the project roads should be made to cater to need of the interior villages more effectively
- During project implementation there should be proper awareness campaign at the construction sites regarding traffic safety, awareness about HIV/AIDS and human trafficking. Right kind of IEC materials in local language & in picture should be displayed and distributed. Police and Block officials to take more active role to apprehend any remote chance of human trafficking, particularly of children.
- NGOs/CBOs/local PHCs should be proactive to make people, particularly the poor families frequently migrating to far off areas, aware of the risks of HIV/AIDS. Village quacks and ANMs to be trained in detecting and responding to cases of HIV/AIDS at initial level. The school children should be given formal road safety training as part of curriculum.

REFERENCES

- [1] Sharma, Niraj Dev, Pankaj Dutt Dhyani, Rajani Ganpadhyay, S, Environmental impact assessment of road and highway project, **Dec (2009)**, CSIR.
- [2] Amit Bijon Duttal and Ipshita Sengupta, Environmental Impact Assessment (EIA) and Construction, International Research Journal of Environment Sciences, ISSN 2319-1414, Vol. 3(1), 58-61, **January (2014)**.
- [3] An Assessment of Environmental Impacts of Building Construction Projects, Edoke Augustine Ijigah, Richard Ajayi Jimoh; Bamidele O. Aruleba. & Abduiquadri Bilau Ade., Civil and Environmental Research, ISSN 2222-1719 (Paper) ISSN 2222-2863 (Online), Vol 3, No.1, **(2013)**.
- [4] Environmental impact assessment and resource management, a haida case study: implications for native people of the north catherine shapcott, 3 — 6 washington avenue, toronto, ontario, canada, m5s 1L2.
- [5] Research Project on Assessing Quality of Environmental Impact Assessment (EIA), Compliance of Environmental Clearance (EC) Conditions and Adequacy of Environmental Management Plan (EMP) of Mining Industry in Goa **(2013)**
- [6] Ganeshkumar B., Gobinath, Prabhakaran N. and Rajeshkumar K., Modified EIA for small and medium projects – An effective method to make the projects Eco-friendly, *International Journal of Environmental Sciences*, **1(1)**, 55-65 **(2010)**
- [7] Mhaskar Z., Environmental Impacts of Construction Activity & Site Control Practices, Ecohousing India, **(2005)**.
- [8] Dutta B.K. and Bandopadhyay S., Environmental Impact Assessment and Social Impact Assessment – Decision Making Tools for Project Appraisal in India, *International Journal of Human and Social Sciences*, **5**, 6 **(2010)**
- [9] Suryawanshi P.C., Jain K.A., Bhardwaj S., Chaudhari A.B. and Yeole T.Y., Solid and Liquid Wastes: Avenues of Collection and Disposal, *International Research Journal of Environment Sciences*, **2(3)**, 74-77 **(2013)**
- [10] Umesh Babu M.S. and Puttaiah E.T., A Study on Inventorization of GHGs from Energy and Industrial Sector and their Impacts in the Tungbhadra River basin, South India, *International Research Journal of Environment Sciences*, **2(3)**, 35-40 **(2013)**
- [11] Kumar N., James A. and Nath S., Study on Noise Pollution level in Parks of Allahabad City India, *International Research Journal of Environment Sciences*, **2(8)**, 88- 90 **(2013)**
- [12] Dasgupta S.C., What ails EIA for building and construction projects, Sustainable building programme, CSE **(2012)**.
- [13] Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii) Ministry of Environment and forests **(1999)**
- [14] Arquiaga M.C., Canter L.W. and Nelson D.I., Risk Assessment Principles in Environmental Impact studies, *Environmental Professional*, **14**, 204-219 **(1992)**
- [15] Arquiaga M.C., Canter L.W. and Nelson D.I., Risk Assessment Principles in Environmental Impact studies, *Environmental Professional*, **14**, 204-219 **(1992)**.

Author Short Biography-

Dr. Santosh K Sar received B.Sc. And M.Sc. Degree from Govt. College Durg, and Ph.D. Degree from Pt. R.S.S. University Raipur (C.G.) and post Doctor Fellowship form Inha University, Inchon, South Korea. He works in Bhilai institute of technology



Durg as, professor, Department of applied Chemistry. His current research interest includes environmental science. Dr. Sar is a Life Member & Joint Secretary Society for Ecological and Environmental Development, Bhilai , Life Member Indian Science Congress Association, Kolkatta , Life Member Red Cross Society, Durg , Life member Indian Society for surface science & technology , Jhadavpur University , Kolkata . Fellow Member International Science congress Association and International Society for Chemistry and Environment, Indore, FW/S-5079.