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Contents

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'Journal of integrated research and development' is a referred journal in subjects of different disciplines published by the Secretary, State Govt. College Teachers' Organization (W.B.). We give emphasis to different research works for publication by the Editorial Board. We also publish review of books and monographs in our journal. This is our third volume that we have published. In this volume we have especially focused on the aspects of environment and developmental issues. We request the authors to follow the guidelines that we have mentioned in our website (sgcto2011.hpage.co.in). Retrieval or transmission of any matter of the journal in any form is by no means permitted without the approval of the publisher.

Dr. Barin Kumar Roy.
(Managing Editor),
Secretary, SGCTO(WB)

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This is the third volume of our publication of "Journal of Integrated Research and Development". We are glad to inform you that we are getting remarkable support from different universities, colleges and institutions from all over India and abroad as well. Now our organization i.e. 'State Govt. College Teachers' Organization' is merged With WBCUPA (West Bengal College & University Professors' Association) and will work as Govt. college wing of WBCUPA. Therefore our next and onward issues shall be published in the name of WBCUPA. We hope that our journal shall get a greater platform to improve its quality and go for a better impact factor for the benefit of the researchers.

Dr. Barin Kumar Roy.
(Managing Editor)

Social Capital: An Instrument for Empowering SMEs

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Abstract

The challenges faced by SMEs in achieving sustainable growth can be associated to their small size to a great extent. To achieve sustainable growth SMEs must have proper information of initiatives to be taken, knowledge of innovative techniques of production and know-how which is inaccessible to them given their resource scarcity and small size. It is practically impossible for SMEs to achieve sustainable growth in isolation. In this context, social capital in the form of networks can play a significant role in overcoming the challenges faced by isolated SMEs and equip them with information, knowledge and technology and finance required for sustainable growth. Networking with various stakeholders and external agencies can provide SMEs the required resources to adopt an approach of sustainable growth. Networking generates social capital which leads to increased efficiency for the SMEs at a reduced cost and empowers them for sustainable growth in the long run.

1. Introduction

Small and medium enterprises (SMEs) play a key role in initiating and sustaining economic growth and equitable development in developing countries by creating employment opportunities, providing goods & services at affordable costs by offering innovative solutions and sustainable development to the economy as a whole. However, to compete with large and global enterprises, SMEs need to adopt sustainable approach in their operations. Business sustainability makes firms resilient so they are better able to adapt to change. Compared to firms that focus on short-term profits and that make decisions based solely on the bottom line, sustainable companies think long-term. They forge strong relationships with various stakeholders and members of the community and as a result, can endure major shocks like global recessions, worker strikes, executive scandals and boycotts by environmental activists. SMEs with sustainability integrated in their business models can have access to new markets and increased business opportunities. But SMEs face several challenges in the process of attaining sustainable growth like lack of resources, time and money; lack of capabilities, skills and knowledge; lack of awareness of issues, risks, regulation; lack of training needs analysis (TNA); lack of awareness of tools and techniques; lack of

awareness of provisions and their benefits; lack of strategic and holistic thinking; lack of internal communication and integration; lack of work floor staff involvement; lack of flexibility and fear of change; lack of external communication (networking) and mistrust of other companies in groups.(Hilton, 2000)

Given the small size and scale of operation of SMEs, it is quite impossible for them to overcome these challenges and achieve sustainable growth in isolation. Social capital in the form of network ties can empower SMEs to equip themselves in achieving sustainable growth.
The rest of the paper is organized as follows. Section 2 discusses the concept of social capital in the form of networks and its potential in empowering SMEs to achieve sustainable growth. Section 3 focuses on the role played by social capital in empowering Indian SMEs. Section 4 draws the concluding observation.

2. Empowering SMEs through social capital

The challenges faced by SMEs in achieving sustainable growth can be associated to their small size to a great extent. To achieve sustainable growth SMEs must have proper information of initiatives to be taken, knowledge of innovative techniques of production and know-how which is inaccessible to them given their resource scarcity and small size. It is practically impossible for SMEs to achieve sustainable growth in isolation. In this context, social capital in the form of networks can play a significant role in overcoming the challenges faced by isolated SMEs and equip them with information, knowledge and technology and finance required for sustainable growth.

For this study, a definition of social capital was adopted from Inkpen and Tsang's (2005) perspective: 'Social capital is the aggregate of resources embedded within, available through, and derived from the network of relationships possessed by an individual or organization.' The term networks describes a collection of "actors" (people, departments or businesses), and their strategic links (family, community, finance, business alliances) with each other (Johnsen and Johnsen, 1999). Nahapiet and Ghoshal (1998), combine the organization's external and internal networks by arguing that social capital is the sum of its actual and potential resources that are embedded within, available through, and derived from the network of relationships by an individual or social unit.

From a network perspective, small business owners invest in networking when there is potential to share resources needed for succeeding in a competitive market. Thus, resource sharing is one motivation for networking. Frequently business owners identify difficulties in obtaining information relating to marketing, financing, and technology (Malecki and Veldhoen, 1993). Social capital and networks are said to enable exchange of information and knowledge and the creation of new knowledge (Arenius and De Clercq, 2005).

Networking with government agencies, banks, financial institutions, research and development agencies, training institutes, firms in the supply chain, trade/industry specific associations, Chamber of Commerce members of the community and other firms can provide SMEs the required resources to adopt an approach of sustainable growth. This can lead to increased efficiency for the SMEs at a reduced cost

which may be reflected in their financial statements in the long run. Figure 1 reflects how social capital n the form of network empowers SMEs for sustainable growth.

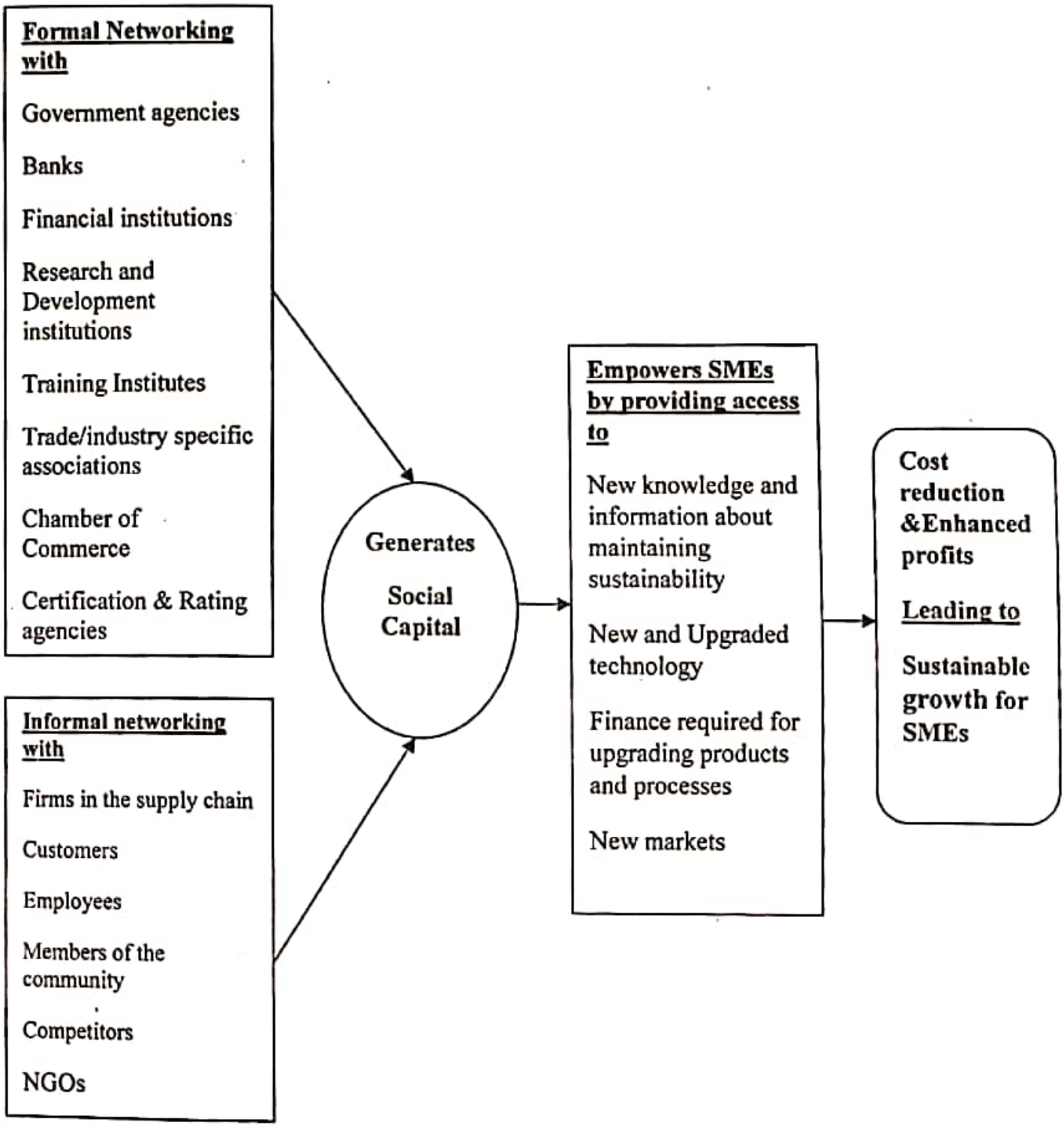

Figure 1: Role of social capital in empowering SMEs

Source: Self compiled

3. Role of Social Capital in Empowering Indian SMEs

According to Small & Medium Business Development Chamber of India, SMEs currently contribute to 45 per cent of the nation's industrial output as well as 40 percent of the total exports. SMEs form 95 per cent of the total industrial units in the country and manufacture around 8,000 quality products for the Indian as well as international markets. A few instances of networking activities that have empowered/have the potential to empower Indian SMEs towards sustainable growth have been enumerated in this section-

- **Clustering**

According to the United Nations Industrial Development Organization (UNIDO), clusters are agglomerations of interconnected companies and associated institutions. Enterprises operating as part of the cluster manufacture related or similar products and are located in spatial proximity. Indian SMEs are increasingly organizing themselves in clusters, which improve their access to business associations and technical assistance providers. It also helps in building inter-firm cooperation that adds to productivity and innovation. The SME clusters in India already account for 40 per cent of the country's industrial output and35 per cent of direct exports. Tirupur cotton hosiery cluster, Agra footwear cluster and Ludhiana woolen knitwear cluster are a few among several successful SME clusters in India. Combining cooperation and competition through networking and harnessing them to ensure high growth within the cluster depends on the existence or development of trust which generates social capital among the member units. Here social capital is sum of the resources available to SMEs through clustering which empowers them and enables them to compete with large corporations and attain high and sustainable growth in the long-run.

- **Credit rating**

SME Rating Agency of India Limited (SMERA) is India's first and the only rating agency focused on the SMEs. SMERA is a joint project of Small Industries Development Bank of India (SIDBI), Dun & Bradstreet Information Services India Private Limited (D&B), and many leading banks. SMERA was established to design a system to facilitate the banking sector in providing credit to SMEs. SMEs with rating from SMERA are able to seek easy and timely credit on favourable terms. SMEs have witnessed growth in business due to this credit rating as it enables large corporate houses build confidence in the SMEs when the latter seek to form part of vendor base of the former, strengthens the position of SMEs among peers for the one bearing credit rating, allows easy comparison and enables them to explore opportunities internationally as rating provides a platform for trade partnerships with global players. In short, rating instills trust of various stakeholders in SMEs. Networking with the credit rating agencies generates social capital for SMEs in the form of resources available to them due to favourable rating which in turn empowers them.

- **Financing**

In order to garner more funds for MSMEs, the government is drawing the attention of private equity (PE) firms and venture capitalists (VC) towards these units. The Ministry of Micro, Small and Medium Enterprises (MSME) has plans to network major PEs through informal meetings to invest in MSMEs. Furthermore, in July 2011, the secretary of Department of Industrial Policy and Promotion (DIPP) announced plans to offer incentives to VC son their investments in SMEs. Also, SMEs will now have greater exposure to public funds given the recent launch of an SME exchange at the Bombay Stock Exchange (BSE). The BSE SME Exchange commenced operations in March 2012 and about 100 companies are expected on its trading platform by mid-FY13. The exchange is set to be a key source of low cost equity capital for SMEs to aid their growth and expansion plans. This formal networking with the financial institutions will provide SMEs with the required finance which in turn will generate social capital and empower them.

- **Information Technology**

Indian SMEs are increasingly waking up to the realization that technology is going to play a crucial role in the sustainable development - a key factor in staying competitive in a fast paced global scenario. IT-using manufacturing businesses revealed better performance indicators in terms of profitability and labour productivity than those that did not use technology. IT contributed to about 32% change in value addition and is the second largest contributor to increasing operating profits after plant and machinery and before transportation equipment. Project Vikas, an initiative of Microsoft India along with the National Manufacturing Completive Council (NMCC), provides SMEs with the benefit of cloud computing. The IT solutions provided under this do not require any specific IT infrastructure and the SMEs can avail of the pay-as-you go model, somewhat akin to using electricity where payment is made for the amount used (Sodhi, 2010). Networking with the large players in the field of information technology provides SMEs with upgraded technology, a resource which would otherwise be unaffordable for them. This resource generates social capital which can empower the SMEs to meet the challenge of lack of technology.
Other than these, there are several initiatives taken at the government and industry level to empower SMEs to overcome their challenges. Social capital is generated through various formal and informal networking activities which provide SMEs with required resources for sustainable growth.

4. Concluding Observations

For attaining sustainable growth SMEs require a clear understanding of sustainability practices within the organization. They need to find innovative ways in which they can benefit their various stakeholders and also yield benefits for their business. Networking with customers, suppliers, investors and employees can provide SMEs with their sustainability needs and proper weightage can be given to their requirements. Initiatives at the national, international and industry level can help SMEs become more sustainable. Networking with various agencies at these levels can generate knowledge and information and other resources required for sustainable growth of SMEs. Limited time, finances and human resources, combined with a lack of expertise in sustainability, make it hard for SMEs to choose the right initiatives and tools for sustainable growth. Social capital in the form networks can empower SMEs to achieve

sustainable growth by providing access to required resources. Initiatives must be taken at the policy framing level to encourage such collaborations and networking to empower SMEs towards sustainability.

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মোবাইল টাওয়ার ও একটি যন্ত্রণার ইতিবৃত্ত

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মোবাইল ছাড়া আমাদের প্রতিদিনকার জীবন আজকের দিনে একেবারেই অচল। কোনোকারণে বাড়িতে মোবাইলটা ভুল করে রেখে এলে নিজেকে একেবারেই অসহায় মনে হয়। আমাদের কাছে মোবাইল তো এখন শুধু কথা বলার সামগ্রী নয় ; স্টিল- ভিডিও ছবি তোলা , 3G মোবাইল প্রযুক্তির সাহায্যে লাইভ চ্যাটিং বা অন লাইন টিভি দেখারও অন্যতম অবলম্বন। এর সঙ্গে মোবাইল সংক্রান্ত আরও একটি বিষয়কে আমরা বেশ আপন করে নিয়েছি ।-সেটি হল মোবাইল-টাওয়ার । পথের দু-ধারে দোকান, চার-পাঁচ তলা ফ্ল্যাট-বাড়ি বা হাউসিং কমপ্লেক্স, দু-তিন তলা বাড়ির ছাদগুলো আমরা আর খুব একটা ফাঁকা দেখতে পাই না । দেখি, প্রায় পর পর ,সারি দিয়ে দাঁড়িয়ে রয়েছে মোবাইল-টাওয়ার। রাস্তা-ঘাটে, পরিচিত মহলে অনেককে বলতে শুনেছি, ছাদের ওপরে ওই মোবাইল-টাওয়ার বসিয়ে অর্থাৎ নামজাদা মোবাইল কোম্পানির কাছে ছাদ ভাড়া দিয়ে দারুণ রোজগার হয় মালিকদের। ফ্ল্যাট-বাড়ি বা হাউসিং কমপ্লেক্স - এর মেনটেনেন্স কমিটিও ভালো টাকা পায় ।আর তাতে ফ্ল্যাট-বাসী বাঙালি মধ্যবিত্তের মাসিক প্রদেয় মেনটেনেন্স খরচ অনেকটা কম লাগে ।এরকম যাঁরা ভাবেন , তাঁদের একটি ছোট্ট অথচ ভয়ংকর তথ্য দেওয়া যেতে পারে। নিচের বিষয়টি লক্ষ করা যাক :

Within 91 m from a mobile tower

Name of deceased	Year of death	Cause of death	Age at time of death
Radhabai Sathe	2005	Breast cancer	66
Deshpande	2006	Oesophagus cancer	48
Shubhangee Deshpande	2007	Rectum cancer	66
Pujaree	2008	Cancer	46
Gawai	2008	Breast cancer	52
Shah	2009	Cancer	48
Vidyadhar Dev	2009	Liver cancer	52
Ransube	2009	Throat cancer	73
Archana Malvadkar	2009	Spinal cord cancer	17

Source: L B Deshpande, who studied the deaths in his Solapur locality since two towers were installed four years ago

L.B.Deshpande নামে একজন গবেষক সোলাপুর এলাকায় পাশাপাশি অবস্থিত দুটি মোবাইল-টাওয়ার সংলগ্ন এলাকায় বসবাসকারী স্থানীয় মানুষজনের বয়স উল্লেখ করে তাদের মৃত্যুর কারণ জানিয়েছেন। দুটি মোবাইল-টাওয়ার সংলগ্ন ৯১ মিটারের মধ্যবর্তী এলাকায় ২০০৫ সাল থেকে ২০০৯ পর্যন্ত সময়কালে বিভিন্ন বয়সের ওই মানুষগুলি মোবাইল-টাওয়ার-এর বলি হয়েছেন।

মোবাইল-টাওয়ার কীভাবে আমাদের শরীরের ওপরে প্রভাব অর্থাৎ কু-প্রভাব বিস্তার করে তা জানতে অধ্যাপক, প্রফেসর গিরিশ কুমারের লেখা রিপোর্টটির সাহায্য নেওয়া যেতে পারে। পাঠকের অবগতির জন্য ওই রিপোর্টটির ভূমিকা অংশটি উদ্ধৃত করা হলো :

"Biological Effects of Electromagnetic Radiation

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Preface

I have been working in the area of antennas for nearly three decades. During this period, I have written more than 150 papers in national and international journals and conferences and also written a book entitled "Broadband Microstrip Antennas" published by Artech House, USA in 2003. I have probably designed, fabricated and tested more than 1000 antennas. In 2001, when I was writing my book, I used to spend around 80 to 90 hours per week in the Antenna Lab at IIT Bombay, I started having strange health problem that my fingers would swell and I would feel hot even when AC was ON though my student's would feel very cold. Initially, doctors gave me medicine for skin treatment and later on, I was referred to Neurologist and after several weeks of medicine, there was still no relief. Meanwhile, I also consulted Homeopathy doctor, who after one month of doing experiment on me with his various medicines, told me that he has tried every possible thing and he can not do anything to cure me.

Just around that time, I measured the radiation level in my office and lab, and found it to be very high. There were so many computers around me and there was radiation from all the computers and laptops. Also, we were always doing experiments with microwave circuits and antennas (occupational hazard). So, without realizing, my body was absorbing electromagnetic radiation from all these sources. The solution was simple: we re-arranged all the computers, partly isolated my office from the antenna lab, and I partially recovered in about 3-4 months of time.

Around that time, mobile phones had started coming to India on a mass scale, and cell towers started appearing on top of the residential buildings. I knew that sooner or later, people will start having problems due to microwave radiation.

In 2008, we carried out radiation measurement in the academic area of IIT Bombay, where several cell operators had installed transmitting towers, and found the radiation level to be very high. Thereafter, followed series of emails to our learned faculty members at IIT Bombay, and to my surprise, many of them did not know about harmful effects of microwave radiation on human body. They had so many questions that I had to do lot of research, collected hundreds of papers, saw several hundreds of websites, studied biological effects, and so on. Finally, I decided to ask my daughter, Neha Kumar, who has done B.Tech. in Bio-Technology from Anna University, Chennai to help me in preparing this report.

I sincerely hope that people will find this report useful and they will take immediate precaution to safeguard themselves and their families from undesired microwave radiation.

- Prof. Girish Kumar"

ছাদের মালিক রাজি থাকলে, মোবাইল-টাওয়ার কোম্পানি কি ইচ্ছে করলেই ছাদের ওপর মোবাইল-টাওয়ার বসাতে পারে ? এই বিষয়ে আমাদের দেশে বিভিন্ন রাজ্যগুলির ছবি বিভিন্ন রকম। অন্ধ্রপ্রদেশ হাইকোর্ট W.P No.23228 of 2007, Date: 31-12-2007 - এর দ্বারা স্পষ্ট করে জানাচ্ছে :

"TEC (Tower Erection Company)

1. Shall obtain necessary approval of the Air Traffic Controller, Airport Authority of India.

2. Shall take special precaution for fire safety and lightening etc.

3. Shall furnish a legally valid undertaking that they are solely responsible for any damage to the building and for public safety.

4. Shall furnish NOC from the surrounding building owners, and also from the concerned building owner in case of rooftop installations."

• পাঞ্জাবের Chief Administrator, Chandigarh-এর পক্ষ থেকে Order No.26/6/22-UTFI(3)-2004/388-390, Date: 14.01.2005-এর দ্বারা এর পাশাপাশি জানানো হয়েছে :

I. "Mobile or wireless telephone towers should only be allowed on non-residential buildings of the Chandigarh Administration."

II. "The towers should be shared by at least three mobile companies."

• হরিয়ানাতে এ প্রসঙ্গে জানানো হয়েছে :

"The Mobile towers are allowed in all the zones except utility. However, Cellular Operators are advised to avoid residential area."

• দিল্লি মিউসিপ্যাল করপোরেশান এ প্রসঙ্গে আর একটু বিস্তারিত করে বলছে :

"In case of residential buildings,it shall be certified that no other alternatives is available with the service provider. In case of a group housing residential building, an NOC (no objection certificate) from all the occupants of the housing block along with NOC of the society would be required."

আমাদের রাজ্য পশ্চিমবঙ্গের কি অবস্থা ? আমাদের রাজ্যে, পশ্চিমবঙ্গ সরকারের পরিবেশ দপ্তর থেকে একটি অর্ডার প্রকাশিত হয় [No. EN/939/T-IV-1/001/2006 ,Date : 24 April,2008] হয় ২০০৮ সালের ২৪শে এপ্রিল তারিখে । সেই অর্ডারে পশ্চিমবঙ্গ সরকারের পরিবেশ দপ্তরের Principal Secretary , মাননীয় M.L . Meena স্পষ্ট করেই জানাচ্ছেন :

"... the Department of Environment has received number of complaints regarding indiscriminate installation of mobile towers in residential and school building and after necessary technical scrutiny and after considering different technical papers, it is observed that overwhelming increase in the number of installation of mobile towers even on residential buildings, schools, hostels and hospitals and such installations have a harmful electro magnetic radiations."

কিন্তু অত্যন্ত দুঃখের বিষয় , কোথাও বলা নেই , পশ্চিমবঙ্গ সরকারের পরিবেশ দপ্তরে ওই যে সব অভিযোগ জমা পড়েছে ; সেইসব অভিযোগের ক্ষেত্রে দপ্তরের তরফ থেকে কি ধরণের ব্যবস্থা গ্রহণ করা হয়েছে ? ওই অর্ডার [No. EN/939/T-IV-1/001/2006 ,Date : 24 April,2008] -এ ১৯৮৬ সালের পরিবেশ রক্ষা আইন অনুসারে স্পষ্ট করেই বলা হয়েছে :

"Installation of Base Station Antennas within the premises of schools and hospitals may be avoided because children and patients are more susceptible to Electro Magnetic Field. "

আগেই বলেছি , বাস্তবে ওই অর্ডার [No. EN/939/T-IV-1/001/2006 ,Date : 24 April,2008] কতটা মেনে চলা হয়েছে , সে বিষয়ে যথেষ্ট সংশয়ের অবকাশ রয়েছে । একথা বলাটা খুব ভুল হবে না , শহরাঞ্চলের পথের ধারে দোকান, চার- পাঁচ তলা ফ্ল্যাট-বাড়ি বা হাউসিং কমপ্লেক্স, দু-তিন তলা বাড়ির ছাদগুলোর ওপরে আমরা এখন যে সব মোবাইল - টাওয়ার গুলো দেখছি , ওগুলোর বেশির ভাগই বসানো হয়েছে ২০০৮ সালে । আর বসানোর অনুমতি দিয়েছে স্থানীয় করপোরেশান বা মিউসিপ্যালিটিগুলি । কারণ ওই অর্ডার [No. EN/939/T-IV-1/001/2006 ,Date : 24 April,2008] অনুসারে মোবাইল - টাওয়ার বসানোর জন্য মোবাইল - টাওয়ার কোম্পানি জরুরে স্থানীয় করপোরেশান বা মিউসিপ্যালিটিগুলি থেকে অনুমতি নেওয়ার নির্দেশ দেওয়া হয়েছে ।

পশ্চিমবঙ্গে এরপর ৬ সেপ্টেম্বর ,২০১০ তারিখে রাজ্য দূষণ নিয়ন্ত্রণ পর্ষদ -এর তরফ থেকে একটি STATUTORY CIRCULAR [Memo No. 3060 /5L / WPB / 2008 /M-15 , Date: 06.09.2010] প্রকাশিত হয় । এই STATUTORY CIRCULAR -এ আগের ওই অর্ডার [No. EN/939/T-IV-1/001/2006 ,Date : 24 April,2008] - কে উল্লেখ করে , মোবাইল - টাওয়ার বসানোর অনুমতি দেওয়ার সময় স্থানীয় করপোরেশান বা মিউসিপ্যালিটিগুলিকে কতকগুলি নিয়ম বা গাইডলাইন অনুসরণ করতে বলা হয়েছে শুধু নয় , অনুসরণ করাটা একরকম বাধ্যতামূলক করা হয়েছে । যে যে মোবাইল - টাওয়ার কোম্পানি মোবাইল - টাওয়ার বসানোর জন্য স্থানীয় করপোরেশান বা মিউসিপ্যালিটিগুলির কাছে অনুমতি চাইবে , তাদেরকেও এই গাইড লাইন অনুসরণ করতে হবে । প্রাসঙ্গিক গাইডলাইনগুলি এইরকম :

I. Site clearance should be obtained from the Ministry of Communications &IT, Department of Telecommunications, Government of India.

II. Permissions should be obtained from the local authorities like Municipal Corporations, Municipalities, Gram Panchayets etc.

III. Structural stability certificate should be obtained from any recognized engineering institution of Government of India or Government of West Bengal.

এইখানে একটা প্রশ্ন স্বাভাবিক ভাবেই মনের ভেতরে জাগে , সেটি হল : ২০০৮ সালে যে সব মোবাইল টাওয়ারগুলো বসানো হয়েছে , তা সে যে কোম্পানিরই হোক না কেন , তারা কি ওই গাইড লাইন অনুসরণ করেছে ? ২০১০ সালে তৈরি গাইড লাইন কি করে ২০০৮ সাল থেকে অনুসরণ করা সম্ভব ? তা হলে কি , যে যে করপোরেশান বা মিউসিপ্যালিটিগুলি থেকে তারা অনুমতি নিয়েছে , সেই সেই নির্দিষ্ট করপোরেশান বা মিউসিপ্যালিটি কি নির্দিষ্ট টাওয়ার কোম্পানিকে STATUTORY CIRCULAR [Memo No. 3060 /5L / WPB / 2008 /M-15 , Date: 06.09.2010] অনুযায়ী কাগজ জমা দিতে বলেছে ? বা ,এমন কোনো নির্দেশ কি পশ্চিমবঙ্গ সরকারের পরিবেশ দপ্তর কিংবা রাজ্য দূষণ নিয়ন্ত্রণ পর্ষদ থেকে কি দেওয়া হয়েছে , যেখানে স্পষ্ট ভাষায় বলা হয়েছে ওই STATUTORY CIRCULAR [Memo No. 3060 /5L / WPB / 2008 /M-15 , Date: 06.09.2010] অনুযায়ী কাগজ না থাকলে টাওয়ারটির লাইসেন্স বাতিল করা হবে ?

আসল কথা , বেড়ালের গলায় ঘন্টা বাঁধবে কে ? মোবাইল টাওয়ার বসলে যে কত কত ইনকাম ! কিন্তু যন্ত্রণা যারা বা যে হতভাগ্য, পরিবারগুলিকে সহ্য করতে হয় ,তারাই জানে কী জ্বালা ! শহরে এসে যাঁরা ওই সব মোবাইল - টাওয়ার -এর ছাদের নিচে ফ্ল্যাট বা ঘর কেনেন বা ভাড়া নিয়ে থাকতে বাধ্য হন ; কিংবা হয়ত দেখা যাবে , চিকিৎসার কারণে বা ছেলে-মেয়েকে অপেক্ষাকৃত ভালো স্কুলে পড়াবার জন্য যাঁরা একগাদা টাকা লোন নিয়ে ফ্ল্যাট কেনার পর দেখলেন ছাদের ওপরে মোবাইল - টাওয়ার ! শীত-গ্রীষ্ম-বর্ষা , মাথার ওপরে অষ্টপ্রহর যাদের দুটো দু টনের এ সি একজস্ট মেশিনের ভাইব্রেশন সহ্য করতে হচ্ছে ! তাদের কথা কি কেউ ভাবে ? না কোনো কালে ভেবেছে ? আমি ও আমার পরিবার দীর্ঘ এক বছর তিন মাস ,এই যন্ত্রণা সহ্য করেছি বলেই জানি - কী কষ্ট !

আরও একটা কথা এখানে সবিশেষ প্রাসঙ্গিক , ওই STATUTORY CIRCULAR [Memo No. 3060 /5L / WPB / 2008 /M-15 , Date: 06.09.2010] না মেনে ছাদের ওপর মোবাইল - টাওয়ার বসানো কোম্পানির যদি একটি তালিকা তৈরি করা যায় , তাহলে ওই তালিকায় যে কোম্পানিটির নাম বিশেষ উজ্জ্বল , সেটি হল : BSNL . আমরা যারা সাধারণ মানুষ , তারা বেশিরভাগ সময়েই মনের ভেতরে নিশ্চিন্ত হয়ে এই বিশ্বাস রাখি যে , ভারত সঞ্চার নিগম লিমিটেড মানেই ১০০% সরকারী ব্যাপার । সুতরাং তাদের মোবাইল টাওয়ারের ক্ষেত্রে সব নিয়ম বা গাইড লাইন মানা হয়েছে অক্ষরে অক্ষরে !কৌতূহলী পাঠক যদি ইন্টারনেটে গিয়ে , Googles Box -এ 'mobile tower grievance forum' কথাটি লিখে অনুসন্ধান করেন, তাহলে দেখা যাবে

পশ্চিমবঙ্গের একাধিক ভুক্তভোগী মানুষ লিখেছেন তাদের যন্ত্রণাকাতর অবস্থার কথা। আমিও একসময় লিখেছিলাম । হুগলি জেলার চন্দননগরের সুপ্রাচীন ও স্বনামধন্য সেন্ট জোসেফস কনভেন্ট স্কুলের ঠিক পেছনে অবস্থিত চন্দননগরের প্রথম হাউসিং কমপ্লেক্স , নীলতরু হাউসিং কমপ্লেক্স -এর A ব্লকে , চারতলার ওপরে একটা পুরোনো ফ্ল্যাট তখন লোন নিয়ে কিনেছি । আমাদের আগে সেখানে থাকতেন এক ডাক্তার দম্পতি ।আমি কেনার আগে বছর চার-পাঁচ সেই ফ্ল্যাটটি বন্ধ ছিলো । সেই অবসরে , ওই নীলতরু হাউসিং কমপ্লেক্স-এর মেনটেনেন্স কমিটি BSNL - এর সঙ্গে Priliminary Agreement করে BSNL-এর মোবাইল - টাওয়ার বসায় । এ বিষয়ে আমার কেনা ফ্ল্যাটের পূর্বতন মালিক বা আমরা -কারোকে জানানো হয় নি এবং কারোর কাছ থেকে NOC নেবার সামান্য প্রয়োজনটুকুও বোধ করেনি কমিটির মাতব্বর নেতৃবর্গ । সপরিবার আমি যখন এর প্রতিবাদ করি , তখন আমাদের কমিটির পক্ষ থেকে বলা হয় , আগে থেকেই এসব আয়োজন তারা পাকা করে রেখেছেন । না মানলে পথ আমাদেরই দেখতে হবে । ২০১০ সালের ২৫শে ফেব্রুয়ারি তারিখে সেই টাওয়ার যখন চালু হল- তখন থেকে শুরু হল আমাদের যন্ত্রণার অধ্যায় । মাথার ওপর দুটো ২ টনের A.C EXSAUST MACHINE অষ্টপ্রহর চলছে এবং তেমনি তার ভাইব্রেশন । অবশেষে Right to Information Act,2005- এর সাহায্য নিয়ে যখন সেই চলন্ত টাওয়ারের কাগজপত্র জোগাড় করলাম , তখন দেখা গেল :

- নীলতরু হাউসিং কমপ্লেক্স - এর ৪৬ জন ফ্ল্যাট-ওনারের প্রত্যেকের NOC নেই ।
- যে হোল্ডিং নম্বরে চন্দননগর পৌর নিগম - এর বিগত বোর্ড টাওয়ার বসানোর অনুমতি দিয়েছে , সেই অনুমোদিত হোল্ডিং নম্বরটি A BLOCK - এই নেই।
- রাজ্য দূষণ নিয়ন্ত্রণ পর্ষদ -এর তরফ থেকে জারি করা STATUTORY CIRCULAR [Memo No. 3060 /5L / WPB / 2008 /M-15 , Date: 06.09.2010] কোনো গাইড-লাইনই মানা হয় নি ।

অবশেষে ২০১১ সালের ১১ই জুন রাজ্য দূষণ নিয়ন্ত্রণ পর্ষদ থেকে টাওয়ারের ইলেকট্রিক লাইন কাটার অর্ডার জারি হয় । এই প্রসঙ্গে, রাজ্য দূষণ নিয়ন্ত্রণ পর্ষদ-এর চিফ-ল-অফিসারের তরফ থেকে চন্দননগর পৌর নিগমের কমিশনারকে লেখা একটি চিঠি [Memo No. 952(1)-5L/WPB-2011 /Gen , Date: 18.04.2011]খুবই কার্যকরী ভূমিকা পালন করেছে ।সেই চিঠিতে স্পষ্ট করে বলা হয়েছে :

"...Hon'ble High Court,Calcutta was pleased to pass an order that without the permission of all the occupants of the Housing Complex mobile tower company is not eligible to install mobile tower."

এখনো যারা টাওয়ারের যন্ত্রণা ভোগ করে চলেছেন ,তাদের কাছে এই চিঠি একটি নতুন আলোর দিশা দেখাতে পারে । তবে টাকার লোভ অতিক্রম করে মানুষকে সুস্থভাবে বাঁচতে দেবার জন্য মানুষের সুস্থ চেতনা ফিরে আসাটা সবথেকে জরুরি ।

Environmental Education: an emerging branch of knowledge

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Abstract

Environmental Education is the new area of study of the discipline of education. With recent development and advances, EE is virtually a new source of concerns for educator, teacher, and students. It is an action oriented, project centered and participatory process leading to self-confidence, positive attitudes and personal commitment to environmental protection. This paper mentions the objectives, motives, principles of imparting EE and also discusses the essentials of EE for Common people, meeting the environmental challenge, reforms in formal EE, contribution of EE and then proceeds to discuss details about biodiversity. Some of the causes of global warming, role of microorganism to clean environment, Microbiological treatment of waste, water minimization and land fill treatment, and role of value education in Environmental Education are also highlighted.

Key words : Environmental Education ; Biodiversity ; Global Warming.

Introduction:

Environment is an assemblage of material factors and conditions surrounding the living organism. This refers to a great extent the external environment. In the external environment, inanimate objects and the factors associated with them constitute the physical environment, whereas living things associated to their component parts, tissues, organs, derivatives etc. for the harmonious functioning of life constitute the internal or organic environment. External environment is the domain of environmental science. The external environmental situations concerned to population explosion, use of insecticides in agriculture, nuclear hazards, industrial growth and fast urbanization all over the world along with a desire for higher standard of living have now focused mass attention on the degradation of environment. Realizing the need to control the environmental degradation, different national and international organizations are now coordinating environmental activities that will hopefully lead to a sustainable development of natural resources and economic well-being of the society. However, it is impossible to achieve an environmental awakening without awakening the people. Common people should therefore be communicated and educated to an optimum level so as to develop an environmental awareness. Communication of environmental education is an emerging aspect with aspires to motivate people with a sagacity of environmental deteriorations to be subsided, towards a sustainable environmental development.

The term 'Environmental Education' is a new and latest but it has very ancient roots in our culture. According to Rigveda there are three kinds of god - the celestial, the aerial and terrestrial i.e. land, air and water. The whole Brahmands was full of peace and happiness because life and environment were so closely related that it was difficult to think man and organism as something separate from environment. Environmental Education is the new area of study of the discipline of education. With recent development and advances, environmental education is virtually a new source of concern for educator, teachers and students. As with the rapid development in each area, there are problems – both internal and external ones to be confronted and resolved. In present time man and environment considered to be interrelated and there independence in them. The environment becomes a source of sorrow and in happiness because dusts of earth, light and air of sky have the adverse effect on human beings. Therefore, it recognizes the need of introduction of 'environmental education'.

Environmental education is an action process related to the work of almost all subject areas. According to the World Conservation Union " Environmental Education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among man, his culture and his biophysical surroundings. Environmental Education also

entails practice in decision-making and self formulating of a code of behavior about issues concerning environmental quality." This is an action oriented, project centered and participatory process leading to self-confidence, positive attitudes and personal commitment to environmental protection.

Objectives of EE:

Awareness – i.e. acquire sensitivity to the total environment and its allied problems.
Knowledge – to know conservation of natural resources.
Skill – i.e. acquire skill for identifying environmental problems.
Attitudes – i.e. acquire a set of values and feelings of concern for the environment and the motivation for active participation in environmental improvement and protection.
Participation – to provide an opportunity to be actively involved at all levels in working towards the resolution of environmental problems.
Evaluation – to evaluate environmental measures and educational programmes in terms of ecological, political, economic, social, aesthetic and educational factors.

The Motives:

The following guiding principles would help to achieve the objectives of Environmental Education:
to consider environment in its totality(natural, artificial, technological, ecological, moral aesthetic)
to consider a continuous life long process(from pre-school to higher levels as well as non-formal)
to be interdisciplinary in approach
to examine major environmental issues
to focus on current, potential environmental situations
to emphasize active participation in prevention and solution to problems
to develop critical thinking and problem solving skills
to promote co-operation in solving problems
to discover the symptoms and root cause of environmental degradation

Principles of Imparting EE:

EE brings together the art and science of environment, and the principles and practice of general education. It involves teaching, learning and inculcation of habits concerned with the objectives of environmental development. Learning and teaching is a two-way process of transactions in human relations, between the teacher and taught. There should be an internal learning by which a man grows into a transformed adult individual.
At this juncture, it is possible to abstract certain principles of learning, through the catchwards _PICK A ROSE, to be used in EE.

P – Participation
I – Interest
C – Comprehension
K – Known to unknown
A – Actuation
R – Reinforcement
O – Observation
S – Soil, Seed and Sower
E – Educator

Participation: It is a key word in any educational programme. It is based on the psychological principle of active learning.

Interest: It is a psychological principle that people are unlikely to listen to those things Which are not to their interest. Environmental Educators must find out the real environmental needs of the people.

Comprehension: In EE we must know the level of understanding, education and literacy of people to whom the teaching is directed. Technical words should be avoided and comprehensive discussion is desired.

Known to Unknown: In EE work, we should proceed from the known to the unknown i.e., to start with what the people already understand and then to proceed to the new knowledge.

Acctuation: In every person there is a fundamental desire to learn. Awakening this desire to learn something new is called actuation or motivation. In any educational programme actuation is an important factor.

Reinforcement: It assists comprehension and understanding. Every educational campaign needs reinforcement.

Observation: It emphasizes learning of environmental culture and development by doing, observing and experiencing.

Soil, Seed and Sower: The common people are the soil; the environmental facts are the seed ; and the transmitting media are the sowers.

Essentials of EE for common people:

The common people should be informed to an optimum level, but not to such a higher level where scientific and technical terms are concerned and policy formulations are involved. The components of EE should be selective and may be grouped under four broad headings as follows ;

1. Awareness of environmental health :

Water supply and sanitation; water borne diseases; air-borne diseases; soil-borne diseases; insect-borne diseases; housing and health; radiation hazards; meteorological environment and health; occupational hazards; effects of population explosion; population control; and personal hygiene.

2. Awareness of environmental degradation and sanitation :

Pollution control(air, soil, water, noise); solid waste disposal; biodegradable wastes; waste recycling; excreta disposal and prevention of contamination; sewage management; metal and chemical pollution; arsenic poisoning; industrial hazards; natural cycles(carbon, oxygen and nitrogen); global worming; and so on.

3. Awareness of environmental resources and conservation :

Conventional and non-conventional energy sources and use; judicious use of natural resources(water, land, forest, minerals, agriculture, wilflife, etc); conservation of thousands of species of plants and animals in danger; effects of deforestation; plantation projects and social forestry; forest ecology; sanctuaries; food chain; and ecosystem.

4Awareness on environmental disasters and respective prevention:

Prevention and management of flood, drought, earthquake, land slide, cyclone, volcanic eruptions, crash of thunder, forest-fire, soil erosion(especially coastal and river bank erosion), acid rain etc.

Consequently, the aspects like environmental policy, environmental economics, environmental chemistry, environmental toxicology, meteorology, climatology, environment and human rights, etc and the other high topics may be avoided in imparting EE when common man are concerned as the intended audience.

Meeting the Environmental Challenge:

Basic environmental education is aimed at all the essential goals of environmental education : learning to know, to do , to be and to live together with others, as outlined in environmental education : the Treasure within, the report of the Independent Commission on environmental education for the Twenty-first Century, published in 1996 by UNESCO.
Basic environmental education provides the foundation for all future environmental education and learning. Its goal concerns those in the pre-school primary school-age population, whether enrolled in school or not, is to produce children who are happy with themselves and with others, who find learning exciting and develop inquiring minds, who begin to build up a storehouse of knowledge about the world and more important, an approach to seeking knowledge that they can use and develop throughout their lives. Basic environmental education is, thus, not only the foundation for lifelong learning, but also the foundation for sustainable development.

The motto of the environmental education movement has been : "think globally, act locally". Over a period of more than two decades, it developed a highly active pedagogy based on this premise.

Reforms in formal Environmental Education:

Environmental education plays a dual role, at once both reproducing certain aspects of current society and preparing students to transform society for the future. These roles are not necessarily mutually exclusive. However, without the commitment to sustainable development, curricula have tended in the past to reproduce an unsustainable culture with intensified environment and development problems rather than to empower citizens to think and work towards their solution. The role of formal environmental education in building society is to help students to determine what is best to conserve in their cultural, economic and natural heritage and to nurture values and strategies for attaining sustainable development in their local communities while contributing at the same time to national and global goals.
Reorienting the curriculum towards sustainable development requires at least two major structural reforms in environmental education :

1. There is a need to re-examine the centralized mandating of courses and textbooks in order to allow for locally relevant learning programmes. Local decision-making can be facilitate through the reform of centralized environmental educational policies and curricula, and the formulation of appropriate syllabuses and assessment policies.

2. There is a need to develop new ways to assess the processes and outcomes of learning.

Contribution of Environmental Education:

It is clear that the roots for sustainable development are firmly planted in environmental education. While environmental education is not the only discipline with a strong role to play in the reorienting process, it is an important ally. In its brief 25-year history, environmental education has steadily striven towards goals and outcomes similar and comparable to those inherent in the concept of sustainable development.
In the early 1970s, the emerging environmental education movement was given a powerful boost by the United Nations Conference on the Human Environment, held in Stockholm in 1972, which recommended that environmental education be recognized and promoted in all countries. This recommendation led to the launching in 1975 by UNESCO and the United Nations Environment Programme(UNEP) of the International Environmental Education Programme(IEEP), which continued until 1995.

The influence of the IEEP – and the national and international activities that it inspired – has been widely felt and is reflected in many of the environmental educational innovations carried out in the last two decades.

Biodiversity:

Biodiversity is a vital asset for a country. Maintenance of environment in general and ecosystem in particular of a geographic area largely depends on its biodiversity. The following chart(Table -1) shows the Biodiversity of the world.

Table 1 : World Biodiversity

Organism	No. of species	Identified
Mammals, reptiles and Amphibians	15,210	14,484
Birds	9,225	9,040
Fishes	21,000	19,056
Plants	4,80,000	3,22,311
Microorganisms and Invertebrate animal	3,00,000	2,76,594

Values of Biodiversity
Economic values
Esthetic value
Environmental value
Ethical value
Spiritual and cultural value
Indirect value

Biodiversity in India:

India lying in the juncture of Tropical, Eurasian and Indo Malayan biogeographic realms is one of the most biodiversity rich area of the world. Several studies on biodiversity of India over the past few decades have represented Indian biodiversity panorama in various ways. However, most of them agreed that the total estimated plant wealth of India is about 45,000which represents about 12% of the world plant diversity. Out of the total plant diversity, 15,000are flowering and higher plants of which 5,000 are endemic to India and so far not been reported from any where else in the world and nearly 1,000 species are endangered. In India alone 3,000 plant species are used as medicinal plants by ¾th Indian population for treating a variety of ailments. According to Zoological Survey of India(ZSI),1992 the different faunal breaks up are presented in Table-2. In India, Western ghats, the Himalaya and the Coastal area are the richest biodiversity zones and about 1,800 species out of total 4,000 are endemic to Western ghat only.

Table 2 : Indian Biodiversity Profile

Group	*No. of described species*
Fungi	23,000
Algae	12,840
Gymnosperms(Conifers)	2,843
Angiosperms(flowering plants)	64
Pteridophytes	15,000
Lichens	1,012
Insects	1,940
Fishes(Teleosts)	50,000
Amphibians	2,00
Reptiles	4500
Birds	2000
Mammals	850
Other Invertebrates	25000

Factors influencing Biological Degradation:

In spite of their important role in human survival and their welfare the biological resources are depleting and degrading at a faster rate throughout the world. Nearly 2/4th of the natural habitat in Asia has been degraded (Table 3) and is reported to loose in higher proportion in next 25 years than any other region of the world(World Bank Report,1993). The main reasons behind this destruction and degradation are mostly anthropogenic, like habitat destruction or alteration, over exploitation, introduction of exotic breeds etc. rather than natural loss in evolutionary process. In India alone bio-piracy caused by pharmaceutical companies and illegal trade costs about Rs.145.5 crore per year.

Table 3: Loss of Original Habitats in Asian Countries

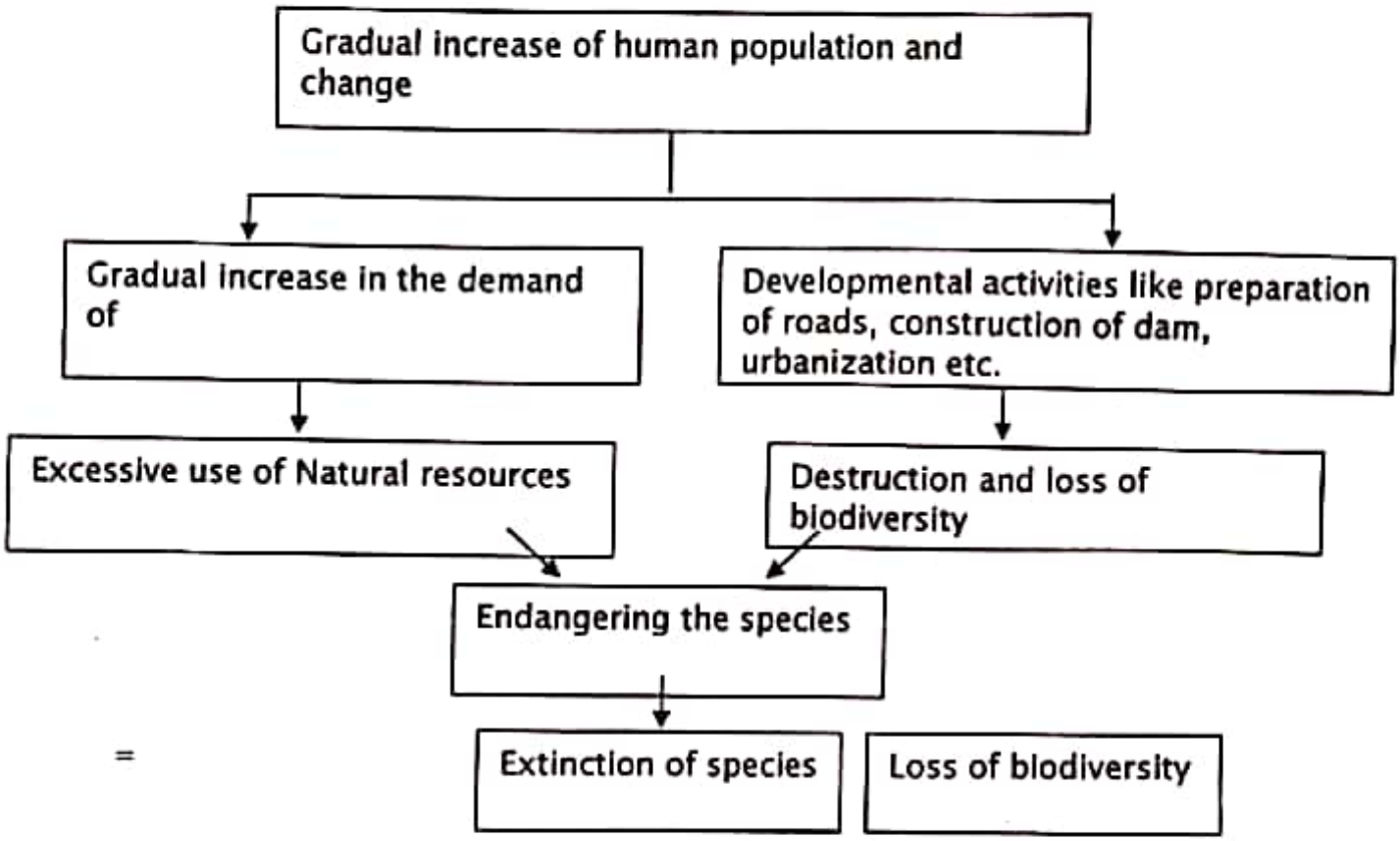
Region	*Loss of Original Habitat(%)*
Bangladesh	94
Sri Lanka	83
India	80
Vietnam	80
Pakistan	76
Philippines	79
Cambodia	76
Thailand	74
Lao PDR	71
Nepal	54
Indonesia	49
Myanmar	43
Malaysia	41
South China	39
Bhutan	34

Causes of Depletion of Biodiversity

Destruction of Forest Lands
Introduction of Exotic Species
Over exploitation of the Species

The following chart shows the interrelationship of the cause of Biodiversity Depletion.

Interrelationship of the cause of Biodiversity Depletion



Recommendations for Biodiversity conservation:

Proper inventorisation of the biological species must be done.
Assessment of all the fragile and sensitive habitats and endangered species may be arranged.
Local level microplan must be drafted after the need assessment and development requirement and its implementation has to be ensured.
People awareness and community participation has to be elicited and incentive may be provided to the local community for effective conservation.
Increased funding coupled with effective institutional networks for biodiversity conservation has to be ensured.
A new economic system has to be established at International level as well as at the national level where, natural resource will get due importance.

Constant review and monitoring of the ongoing management practices must be considered as the part and parcel of the biodiversity conservation of a nation.

Causes of Global Warming:

Carbon Dioxide

There is great concern today that the continued increase in atmospheric CO_2, currently at a rate of about 1ppm per year, might intensify the "green-house effect". CO_2 is transparent to visible radiation, but absorbs strongly in the infra-red range. Visible sunlight striking the earth is irradiated back as longer wavelength infra-red radiation. An increase in CO_2 in earth's insulating atmospheric blanket would retain more of this radiation and thus would bring about a warming trend in the climate. There will most likely be little effect on microbial activity, but if temperature increases and precipitation patterns change, there could be a strong indirect effect.

Chlorofluorocarbons (CFC)

CFCs are entirely the result of human activity. They are used as refrigerant gases in refrigerators and air conditioners, as cleaning solvents, as propellants in aerosol containers, and as expanders in foam products. Although they are present in the atmosphere in minute quantities they are extremely efficient as "green house gases ." Since all CFCs are man-made, its level can be easily controlled. Their release by man is an additional source of free-radicals in the stratosphere. They are the strongest green-house gases known and are also responsible for the destruction of ozone layer. Some CFCs absorb more than ten thousand times as much energy Per mole as does CO_2.

Worldwide CFCs production increased steadily over 2 years prior to 1975(10-15% per year) and declined afterwards due to public concern about the destruction of stratospheric ozone layer.

World-wide uses of Chlorofluorocarbons, 1985(Cunningham and Saigo, 1995) :

Uses	*Share of Total(%)*
Aerosols	25
Rigid-foam insulation	19
Solvents	19
Air-conditioners	12
Refrigerant	08
Flexible-foam	07
Others	10

Methane (CH_4)

Contributing to the green-house effect is a atmospheric Methane, released by human activities, such as drilling for oil and natural gas, landfilling of solid waste and large scale cattle raising and wetland rice cultivation. Methane enters the atmosphere primarily from biological sources. Several kinds of bacteria that are particularly abundant in wetland and rice fields which release methane into the atmosphere. Methane releasing bacteria are also found in large numbers, in the guts of termites and various kinds of ruminant animals like cattle. Some methane enters the atmosphere from fossil-fuel sources. Control of methane sources is unlikely, since the primary sources involve agricultural practices that would be very difficult to change.

Nitrogen Oxide
Nitrous oxide (N_2O) is minor component of the "Global warming picture". It is a stable long-lived gas, formed naturally by blue-green algae and Rhizobium. This gas is 270 times more active compared to CO .

Consequences causing Environment Drift

The Climate Change

Rise in the Sea Levels
Uncertain Agricultural Production and Wildlife
Effect of Precipitation Patterns

Role of Microorganisms to Clean Environment:

Environmental pollution and degradation of Ecosystem is increasing along with fast pace of industrialization. Industrialization contributes to environmental pollution in the form of effluents (e.g. from chemical industries, paper and pulp industries etc.), solids(distilleries) and gases(chemical industries) depending upon the type of industries, nature of raw materials used and the type of process involved. These wastes are discharged into the water system and/or land without knowing the effect it might produce on the ecosystem. The over-exploitation of land and underground water potential is of very high order and there is a great danger awaiting in the near future in the availability of good quality underground water for agriculture. The fertility of soil cannot last for ever unless it is replenished periodically and properly. Dispensing with organic manures coupled with increased use of inorganic fertilizers, though much useful for higher production, leaves in soil and water harmful substances leading to acidify alkalinity and other hazards.

Biological diversity which covers wide range of plants and animals constitutes the important component of stability in the natural ecosystem. The maintenance of soil fertility through organisms releasing the plant nutrients is one of the principles of suitable agriculture. Soil health could be well protected by the incorporation of different kinds of organic materials and stimulating the biological activity of the beneficial organisms. Integrated nutrient management, integrated pest management form integral part of environmental management to derive the maximum benefits from natural nutrient cycles.

Biotechnology has been evaluated by many industries as a process toll to achieve particular end results. It has had a major impact in several areas including medicine , genetics/ molecular biology and the environment(waste water treatment and toxic waste neutralization), other industries like the chemical industry, the dairy industry(viz., waste treatment and food processing), the brewing industry(viz., waste treatment, fermentation technology) have invested significant expenditure on biotechnology.

Microbiological treatment of waste; Water minimization and land fill treatment

The destructive capability of microorganisms has been recognized for some time. Under the appropriate conditions, bacteria and fungi can decompose virtually any organic material from wood and coal to pesticides and PCBs. In any given soil sample, microorganisms can be identified that will have the necessary genetic profile to decompose specific compounds. There are also a variety of ways to multiply the micro organisms present in the natural environments and to enhance their activity.

Following rather simple experiments of ploughing waste land and spraying with nutrients to stimulate bacterial growth, technology has evolved into what is now called "Genetic Ecology". Detailed studies of how environmental processes could be controlled at the genetic level in microorganisms have enabled methods to be developed which result in the destruction of toxic wastes in both land and water.

Role of Value Education in Environmental Education:

Everywhere in the world today the environmental degradation is escalating. The air, land and water are increasingly becoming polluted. In some cities or large concentrations of population, the sky is no longer as clear on a summer day as it used to be. The atmosphere is becoming warmer and warmer because of the increase in its Carbon dioxide content and several other such examples are common. It can be very well said that the world is virtually sitting on an environmental time bomb that is ticking away without the consciousness of many of us and unless we diffuse it soonest, our life on planet earth will be imperiled, or even worse, snuffed out simply because of our lack of concern for the common good and the absence of a sense of responsibility for sustaining a balanced ecosystem.
What we need to do is to reorient the citizenry's value i.e., imbue them with proper attitudes and values, specifically those that will lead to a greater concern for preserving balances in ecosystem beside teaching them how to save environment from further degradation. This is where the values development can play a control role in Environmental education. The desire to help preserve the balance in the ecosystem specifically, to contribute to the detoxification of the environment, and to help make it more healthy and progressive place to live in, springs from a strong sense of social responsibility. In Environmental education, the values development strategies that will yield the best results are those which emphasize the provision of opportunities for learner to act on their values. A value is not developed unless it manifests itself. Experimental learning is not confined to the classrooms but extends to the home and community. Thus, it has great potential for developing values that relate to environmental preservation and development. In EE, the emphasis should be on developing the values of social responsibility, concern for others and harmony with nature. We should therefore, understand our environment and know how to use it for our individual well being and welfare of the society and also for the future generations.

Present Scenario:

As we have already depleted lot of our natural resources it is the need of the day we should have a control on the unlimited use of our resources so that we could improve our environment. For this proper planning and management of resources as well as the environmental impact assessment should be done before establishing any developmental activity. Every person of the country should be aware of the consequences of changed environmental conditions. Non-Governmental Organisations also play important role in educating people and controlling environment. So it is important to safeguard our environment which in turn safeguards the living beings.

Conclusion:

Today, EE movement has gained a momentum all over the world. The Govt of India, State Govts and NGOs have already focused their men, money and media to promote the EE programmes but the equation is still in infancy as far as the achievements are concerned. EE is a complex activity. It should be carried on by a variety of people, not just by educational specialist. Among them are parents, environmental educators, teachers, friends, administrative and environmental personnel, health educators and numerous others.EE should be concerned of everybody engaged in any form of community welfare work. EE is education about environment, through environment and for environment. Mahatma Gandhi's perspective

of education – " Education for life, through life and throughout life" – is the essence of Environmental Education.

NATIONAL AGENCIES/ORG.	URLs(Uniform Resource Locators)	Information Components
Environmental Information System- ENVIS;India	www.envis.nic.in	Environmental education as well as environmental information
Ministry of Environment and Forests, Govt. of India.	www.moef.nic.in	Public information and rules and regulations on environment and forest
Environmental Information Centre, Govt. of India.	www.eicinformation.org	Environmental data and information on air, water, soil demography and so on.
Centre for Environmental Education	www.ceeindia.org	Various aspects of environmental information and education

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ENVIRONMENTAL HAZARDS OF CELL PHONE: AN OVERVIEW

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Abstract

Today cell phone is a useful thing in our every day life. Our younger generation can not think a moment without a cell phone. It has lot of advantages. But the cell phone as well as the cell phone based personal communication systems has some inherent adverse effects on environment as well as in human health. But it is very much unfortunate that the people of this century are not concerned properly about these adverse effects of cell phone. In this article an attempted has been made to discuss the different adverse effects of cell phone on human health as well as on our environment.

A. Introduction

In 1974 Federal Communication Commission (FCC) allocated a 40 MHz spectrum band in the 800 MHz to 900 MHz frequency range for mobile communication and licenses were issued in the market in 1982. Then the world wide mobile based personal communication system as well as cell phone technology was developed after 1983. Cell phone technology has changed quickly over time and continues to develop, which means that human exposures also change over time. Today Smartphones are the most popular phones on the market. A Smartphone is defined as a cell phone that is capable of doing more than just a phone. Users can email, search the web, edit documents, keep a calendar, check the weather, play games, and perform many other functions.

The two primary mobile communication technologies used today are the Global System for Mobile Communications (GSM) and the Universal Mobile Telecommunications System (UMTS). The GSM network is divided into various cells that interact with a corresponding tower to serve mobile phones in that area. Universal Mobile Telecommunications Service (UMTS) is 3G broadband that transmits packets of information, including voice, video, and text. UMTS is a global standard that will eventually provide consistent services and coverage anywhere within range of the land-based or satellite transmitters.
By 2007, text messaging had overtaken talking as the primary use of cell phones. Today, young teen's text more, talks less, and watches more videos on their phones than other age groups. All cell phone emits an electromagnetic radiation in microwave frequency range. The increased use of cell phones by children, or the overall increase in cell phone use by adults, means that human exposure to electromagnetic radiation is happening in every time. Very young children are using them, teenagers live on them—and some even sleep with them on their pillows, as cell phones are often used as alarm clocks. A person who is text messaging, accessing the internet, or using a "hands-free" device will have lower exposure to Radio Frequency (RF) energy than someone holding the phone against his or her head. Someone who stores the phone in a briefcase or purse will have far lower exposure than one who carries the device in a pocket. This is the case even in standby mode because of the device's constant searching for service or new messages.

So the question is what do these exposures consist of and what do they mean for human health? Whether the cell phone itself affects our environment or not?

B. Effects of cell phone on human health

Several groups of scientists and WHO reports stated that low-level exposure to RF radiation could cause a wide range of health effects, including behavioral changes, effects on the immunological system, reproductive effects, changes in hormone levels, headaches, irritability, fatigue, and cardiovascular effects. The majority of studies examining biological and health effects of cell phone radiation have focused on the potential of cell technologies to cause dreaded events like cancer, nervous system disorders, and adverse reproductive effects.

Genotoxic effects and DNA Damage: Cell phones emit non-ionizing electromagnetic radiation that can energize nearby tissues in a manner that can alter the biochemistry of human tissues and change the structure of human DNA. Among 101 papers that examined the genotoxic effects of radiofrequency electromagnetic field (RF-EMF), nearly half reported damage to genetic material. Other studies found that exposures impair the ability to repair DNA damage. Researchers have studied the potential of RF-EMFs to cause changes in a cell's genetic material (DNA) and/or to damage the genome. "Genotoxic" substances can potentially cause genetic mutations or cellular damage that can contribute to the development of cancerous tumors. DNA studies have particular importance with respect to children. Researchers who placed a mobile phone at a one-meter (about a yard) distance from human cells found a reduction in DNA repair in cells with double-strand DNA damage. The strongest effects were observed in stem cells. Since stem cells are more active in children, researchers argue that children may be at an increased risk of cancer from cell phone exposures.

Cell phone use and cancer: In 2011, the World Health Organization's International Agency for Research on Cancer (IARC) classified electromagnetic fields as possibly carcinogenic to humans, based on an increased risk for glioma, a malignant type of brain cancer associated with wireless phone use.

Effects on nervous system: The brain is especially susceptible to numerous environmental insults that can produce irreversible damage during critical periods of nervous system development between conception and the age of 21. This vulnerability is well recognized for ionizing radiation, alcohol, tobacco, some pharmaceuticals, cocaine, and stress. The effects of these agents are dependent on dose and timing of exposure. However, even small exposures during periods of neurogenesis have a more profound effect than exposures during adulthood. The effects of exposure to RF-EMFs from cell phones on the human nervous system have been the subject of a large number of studies in recent years. Minor effects on brain activity have been found but have not been related to adverse health effects. Experiments by Narayanan et al. found that memory retention and retrieval were significantly affected in mobile phone RF-EMF exposed rats. Several other studies have also measured cognitive effects in animals. The effects of RF-EMF exposure from cell phones on central nervous system (CNS) disorders, such as Alzheimer's disease, migraine, or vertigo, has been the focus of recent epidemiological research in Denmark, which is the first country to investigate a possible association between the use of cell phones and the risk of CNS disorders. The study found a weak, but statistically significant, association between cell phone use and migraine and vertigo.

Ocular Effects: Thermal effects from microwave radiation have been reported to cause cataracts and effects on the retina, cornea and other ocular systems, but non-thermal effects are less well understood. Studies of non-thermal effects of RF-EMFs from mobile phones are relatively recent. Researchers have recommended further study of effects on the eye lens and lens epithelial cells.

Effects on reproductive health: Many studies report molecular and cellular effects following cell phone EMF exposures in organs responsible for reproduction, especially in males. Oxidative stress on human

semen, declining sperm counts, reduced sperm motility, and diminished sperm viability all have been reported to be associated with EMF exposures from cellular devices.

Psychological effects: Recently, psychologists have warned that smart phone users are especially at risk for becoming addicted to their devices. According to a recent Columbia University study, "communication, responsibility, and relationships all seem to be negatively influenced by the use of text messaging" in both early and late adolescent groups. Frequent mobile phone use has been associated with stress, sleep disturbances, and symptoms of depression among young adult men and women. Common effects, both reported in the literature and easily recognized, include distraction from social contact among those nearby, the inability to focus on complex and long term tasks, and a heightened sense of anxiety.

C. Environmental hazards of cell phone

Mobile phones may be one of our smaller electronic possessions, but the environmental issues surrounding them are proving to be a sizeable challenge. As with all electronic equipment, mobile phones contain a range of substances that are harmful if the devices are not disposed of properly. Heavy metals such as mercury, lead and cadmium are present within mobile phones, especially older models, as well as brominated flame retardants in the devices' printed circuit boards and casings. These substances have been linked to cancers and other disorders in humans, and can have a devastating impact if they are released into the environment. The United Nation (UN) Environment Programme estimates that up to 50 million tonnes of waste from discarded electronic goods is generated annually, with the majority being shipped from the West to developing nations. Traditionally, much of the waste found its way to Asian countries such as China and India, but tighter regulations means more and more is ending up in Africa where there are few facilities to safely deal with it. The issue was the main focus of a recent conference on the UN Basel Convention, designed to regulate international trade in toxic waste.

Effects of cell phone towers: The cancer potential of cell phone towers is also of growing concern. Cell phone towers are made of electronic equipment and antennas that send and receive radio frequency signals. When cell phones are used to make calls, signals are sent to and from the base station of the cell phone tower. These signals are given off into the surrounding environment, which can travel extremely long distances, where people may come in contact with them. In addition, unlike intermittent and concentrated cell phone radiation, radiation from cell phone towers exposes the entire body for extended periods of time. This has caused people to question the dangers of these signals. Currently, the FCC, a U.S. government agency which regulates interstate and international communications, asserts that radio frequency emissions from cellular towers are generally "thousands of times below safety limits" and they do not pose a threat to nearby residents or students. The Environmental Working Group claims that the necessary and extensive studies on this topic have not yet been conducted to determine the effects of long-term exposure to cell phone tower radiation. Although studies are inconclusive, like the case with cell phones, it takes several years for cancer to develop and the symptoms have perhaps not yet been detected.

Cell Phone recycling problems: Cell phones are the most omnipresent electronic product on the globe. With relatively short lifecycles because of their perceived obsolescence, discarded cell phones are a significant and growing problem throughout the world. In the United States, millions of cell phones that contain hazardous lead, mercury, cadmium, arsenic, and flame retardants are thrown out every year.

Toxic effects of cell phones: Many components of mobile phones are considered toxic like arsenic, lithium, cadmium, copper, lead, mercury and zinc. These poisonous substances may leach from decomposing waste in landfills, seep into groundwater and contaminate the soil. Metals build up in the

soil, can then enter the food chain and in sufficient concentrations may cause health problems but not just the dumping of mobile phones is dangerous for the environment. The production of new mobile phones contributes to climate change by using up energy and virgin materials which release greenhouse gasses into the atmosphere. It is estimated that up to 90% of these greenhouse gases can be saved by recycling materials from mobile phones.

Cell phones and car accidents: Driving while talking, texting, or using the internet distracts drivers and increases the risk of accidents. Teens are the population group at greatest risk from cell phone use while driving. The U.S. Department of Transportation is evaluating devices that will disable cell phones if they're traveling above a specific speed.

The following possible means can reduce environmental hazards: Keeping the toxic elements of mobile phones out of the environment is easy. Follow the three environmental principals of

Reduce: Be a smart consumer and think twice before you upgrade your mobile phone. May be your old phone still does the job and you can save the money for a new one?

Reuse: Many people are looking for simple phones, so when you upgrade see if you know someone who might be happy using your old phone.

Recycle: When your phone has come to the end of its life donate it for recycling.

D. Laws, Regulations, and Policies

Many countries have set regulations that limit personal exposures to radio frequency energy. Although many U.S. agencies have addressed the issue, there are no federally developed standards in the U.S. for safe RF exposure levels. The International Commission for Electromagnetic Safety (ICEMS), "strongly advises limited use of cell phones, and other similar devices, by young children and teenagers". On the other hand, the FCC guidelines specify exposure limits in terms of the Specific Absorption Rate (SAR), a measure of the rate at which RF energy is absorbed by the body. The allowable SAR limit for cell phones is 1.6 watts per kilogram (W/kg), averaged over one gram of tissue, for the head; 0.08 W/kg for whole-body exposure; and 4 W/kg for exposure to the hands, wrists, feet and ankles. Germany, Russia, Sweden, Switzerland, India, Israel, and Finland have issued warnings that children should not use mobile phones. **In India** limited use of mobile phones by children; children below 16 should be discouraged from using mobile phones. But no enforceable standards limiting human exposure to cell phone radiation exist till now. Precautionary language on packaging is required by the FCC to warn consumers about cell phone radiation emissions, or how people can reduce exposures. The FCC requires manufacturers to ensure that cell phones are below SAR levels and asserts that all phones legally sold are therefore "safe." So, it is clear that some strong regulations or policies from government part are very much essential today to reduce different health effects of cell phone.

E. Valuable Suggestions

Some important recommendations have been suggested for individuals by Environment and Human Health Inc. in their project report published in February, 2012 which is summarized as follows:-

a) Do Not Drive and Use Your Cell Phone: because driving while using cellular devices greatly increases the likelihood of having an accident.

b) Try to reduce the amount of time spent with the cellular device held against your ear and head. Use a speakerphone, if possible, or a wired headset to reduce your exposure to RF radiation.

c) Avoid Sleeping with Cellular Devices: Sleeping next to cell phones causes unnecessary exposure to electromagnetic fields. The cell phone should be kept several feet from the bed.

d) Carry Your Cell Phone Safely: While in standby mode, cell phones normally send and receive signals. Carrying a cell phone in your pants or shirt pocket will emit electromagnetic radiation to nearby tissues. Try to carry your cell phone away from your body.

e) Learn the Emission Rating for Your Phones: Learn about the emissions and antenna location for your phone. When purchasing cellular devices, consider the relative emission levels of different brands and models, and be especially cautious if you are providing children with access to the device, or if you are a woman of childbearing age.

f) Avoid Psychological Dependency: Avoid cell dependency by checking and responding to messages at pre-planned times.

F. Conclusions

Within last six to eight years, different international organization like FCC, WHO, EHHI etc. published their research project report on the different environmental hazards of cell phones. From these reports it is clear that cell phone is very much hazardous for human health. It is also clear that this adverse effect of cell phone is greater for young children than the adult person. Due to more awareness and concern over the health effects of radiation from cell phones and cell towers, legislation is emerging. Currently, in Georgia, for example, state legislators have presented bills that would ban the construction and placement of cell phone towers throughout the state on public school properties. On the other hand, the cell phone technology changes very fast day by day; so the continuous research on the health risk of cell phone is very much essential today. Otherwise we face a long term effects on our environment as well as on human health in near future.

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Incentive Mechanism for Production Efficiency and Development under Uncertainty

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Abstract

I investigate incentive mechanism for optimum production under cost uncertainty. I find the incentive mechanism exists if and only if the producer wise income as well as the global income would be greater than the critical values determined by cost uncertainty.

Key Words: Global Optimum, Uncertainty, Nash-Equilibrium.

1. Introduction

This paper investigates an incentive mechanism for production efficiency as well as the efficient allocation of resources under cost uncertainty. Here the cost uncertainty is generated through incomplete information on productivity differentials. Ihori (1996) analyses the impact of productivity differentials on welfare within a non-cooperative game setup.

We use cost minimization behavior to formulize indirect technology functions. The indirect technology functions have been used as valuation functions in order to formulize the setup of incentive mechanisms. We analyzed the possibility of incentive mechanisms with monetary transfers under uncertainty based on the mechanism design theory of the Groves mechanisms.

2. Basic Model

Let us assume that there are n producers producing q_i, where i=1,2,3,.....,n quantities of the same commodity. That means the product is homogeneous. Here n may be large but not very large (infinite). The total commodity produced in a particular period is $Q= q_1+q_2+q_3+.....+q_n=\sum q_i$. Let the producers employ only two inputs Labour and Capital. Total labour employed by the industry is $L=\sum L_i$ and total capital employed by the industry is $K=\sum K_i$. Producer i's cost constraint is,

$E_i= \phi_i r_i K_i + \theta i w_i L_i$

where E_i=cost of ith producer,
K_i=Capital employed by the ith producer,
L_i=Labour employed by the ith producer,
w_i=wage rate fixed by the ith producer,
r_i=rental rate fixed by the ith producer,
ϕ_i and θ_i are expected information of capital and labour respectively.
$\theta_i w_i$ is the unit cost of employing L_i and $\Phi_i r_i$ is the unit cost of employing K_i.
The quasi-linear production function of the ith producer is

$Q_i(K_i,L_i)=a_iK_i+b_i\log L_i$,
a_i & b_i are technological informations fixed for a particular producer but are different for different producers (i.e, parameters).

In case of two producers with $\theta_1 > \theta_2$, the Cournot-Nash equilibrium according to Ihori (1996) would be $L_i=b_i/\theta_i$ and each producer's indirect production function from Nash equilibrium is

$q_N^1(\theta_2;E,b)=b_1 \log (b_1/\theta_1) + E_1 - b_1$ with $L_1(\theta_2)=b_1/\theta_1$ ------(1)
$q_N^2(\theta_1;E,b)=b_2 \log (b_1/\theta_1) + E_2$ with $L_2(\theta_1)=0$ ----------(2)

Here producer 2 is the follower. Thus, under incomplete information situation the optimum allocation would not be implemented even though Nash equilibrium.

In order to have optimum allocation, we use the Groves mechanism [Confer Groves and Loeb (1975) & Holmstrom (1979)]. Thus, we assume that producers could install a certain agency that collects the information and decides allocation and transfers.

When the agency can obtain the true information, it may decide that producer 1 additionally produces $g_2=b_2/\theta_2$ instead of producer 2 and the producer 2 pays the cost $\theta_1 g_2 = (\theta_1/\theta_2)\, b_2$ to producer 1. Then, each producer's indirect technology (production function) becomes

$q_M^1(\theta;E,b)=b_1 \log (b_1/\theta_1 + b_2/\theta_2) + E_1 - \theta_1(b_1/\theta_1 + b_2/\theta_2) + (\theta_1/\theta_2).b_2$ ---(3) and
$q_M^2(\theta;E,b)=b_2 \log (b_1/\theta_1 + b_2/\theta_2) + E_2 - (\theta_1/\theta_2).b_2$ ---------- (4)

respectively. Here one important observation is that for some parameters, the output of producer 2 from direct mechanism in eqn.(4) is greater than that from the indirect mechanism in eqn.(2).

By denoting the reports as $\hat{\theta}=(\hat{\theta}_1,\hat{\theta}_2,\hat{\theta}_3,\ldots\hat{\theta}_n)$ and with $\theta^* \equiv \min_j \hat{\theta}_j$,

we can express the Pareto allocation, $g_i(\hat{\theta})=b_1/\theta^*$ and $G(\theta)=\sum_i(b_1/\theta^*)$. Only the most efficient producer would produce the optimum additional amount and the other producers would pay costs. Let A be the set of all feasible outcomes with $(c_1,\ldots\ldots\ldots,c_n,g_1\ldots\ldots\ldots g_n)\in A$. Then, by using indirect utility functions from the above-mentioned method, we may set-up a valuation function $v_i(.,\theta_i)$ over A for each type θ_i. Specifically, the pay off of producer i with type θ_i from

the reports $\hat{\theta}$ is

$$v_i\left(\left(c\left(\hat{\theta}\right),g\left(\hat{\theta}\right)\right),\theta_i\right)=b_i l_n\left(\sum_K\left(\frac{b_K}{\theta^*}\right)\right)+E_1+\Gamma_{\theta_i^*}\left(\hat{\theta}\right).\left[-\theta_i\sum_K\left(\frac{b_K}{\theta^*}\right)+\sum_K b_K\right]-b_i \text{--------(5)}$$

where the index function $\Gamma_{\theta_i^*}(\hat{\theta})$ has value 1 if $\hat{\theta}\in\theta_i^*$,0 otherwise. We assume that the producers not producing additional amount exploit the whole gain. We can verify that the previously mentioned valuation functions satisfy the convexity condition of Holmstrom (1979). Thus by following Makowski and Mezzetti (1994) we can apply the Groves mechanism into our setup.

3. Incentive mechanism design under uncertainty of θi

A direct mechanism is denoted by $(\theta,<s,t>)$. θ is the message space of the type reports. $<s,t>$ is an outcome function which consists of a decision rule $s: \theta \rightarrow A$ and a transfer scheme $t = (t_1,\ldots\ldots\ldots\ldots,t_n)$ with $t_i: \theta \rightarrow R$ given $<s,t>$, producer i's payoff with type θ_i from a report $\hat{\theta}$ is $v_i(s(\hat{\theta}),\theta_i) + t_i(\hat{\theta})$. We will use the notation $<s,t>$ for a direct mechanism. The global gain function from the Pareto allocation is

$$g(\theta)\equiv\sum_i v_i\left(\left(c(\theta),g(\theta)\right),\theta_i\right)\equiv\left[\sum_i b_i \log\left(\sum_K\left(\frac{b_K}{\bar{\theta}}\right)\right)+\sum E_i-\sum b_i\right]\text{-------(6)}$$

where $\bar{\theta}=\min_i \theta_i$

As a direct mechanism is installed and a state is realized, countries face a direct revelation game [Dasgupta et al (1979)]. A mechanism <s,t> is dominant strategy incentive compatible if every producer has the incentive to report his own type honestly regardless of the other's report schemes at any state, i.e., for all i, for all , for all θ_{-i}, for all θ_i, and for all θ_i',

$$v_i\left(s\left(\theta_{-i},\theta_i\right),\theta_i\right)+t_i\left(\theta_{-i},\theta_i\right)\geq v_i\left(s\left(\theta_{-i},\theta_i'\right),\theta_i\right)+t_i\left(\theta_{-i},\theta_i'\right)\text{----------(7)}$$

A decision rule is outcome-efficient if $\sum v_i\left(s\left(\theta\right),\theta_i'\right)=g\left(\theta\right)$ for all θ, that is, if it always realizes the global gain. A mechanism <s,t> is a first – best dominant – strategy mechanism if it is outcome efficient and dominant – strategy incentive compatible.

Since our setup satisfies the convexity condition in Holmstrom (1979), we can use his result that a mechanism is a first – best dominant strategy if and only if it is a Groves mechanism. Following Makowski and Mezzetti (1994), we can define the participation charge on producer i at state θ as the difference of i's pay off from the overall gain; $h_i(\theta)\equiv g(\theta)-v_i(s(\theta),\theta_i)-t_i(\theta)$ for all i and θ. A mechanism <s,t> is a Groves mechanism if it is outcome – efficient and its participation charges on producer i are independent of i's type for each i. Then, producer i's payoff from the participation in a Groves mechanism at state θ is

$$v_i\left(s\left(\theta\right),\theta_i\right)+t_i\left(\theta\right)=g\left(\theta\right)-h_i\left(\theta_{-i}\right)\text{---------(8)}$$

Since each producer's participation charges are non-distortionary lump-sum in Groves mechanisms, there is no incentive for any producer to lie in the direct revelation game. One simple Groves mechanism is a mechanism with zero participation charges; $h_i\left(\theta\right)=\theta$ for all i and for all θ. Then each producer's payoff would be equal to the global gain $g\left(\theta\right)$ at each θ, and by using eqn.(8) we know than the zero-charge Groves mechanism incurs a deficit $g\left(\theta\right)-v_i\left(s\left(\theta\right),\theta_i\right)$ for producer i at state θ. The (ex ante) expected loss for producer i in the zero-charge Groves mechanism is

$$B_i\equiv E\left[g\left(\theta\right)-v_i\left(s\left(\theta\right),\theta_i\right)\right]=E\left[\sum_{j\neq i}b_j\log\left(\sum_K\left(\frac{b_K}{\bar{\theta}}\right)\right)+\sum_{j\neq i}\left(Y_i-b_j\right)\right]\text{--------(9)}$$

A mechanism <s,t> is ex post individual rational (EPIR) if its payoff is not negative for any producer at any state (we assume that the outside option payoff of any producer i at any state is zero).

Since the agency does not observe producer i's type, the maximum amount that the agency can charge on producer i is

$$C_i\equiv E\left[C_i\left(\theta_i\right)\right]=E\left[\sum_j b_j\log\left(\sum_K\left(\frac{b_K}{\bar{\theta}_{-i}}\right)\right)+\sum_j Y-\sum_j b_j\right]\text{----------(10)}$$

where $C_i\left(\theta_{-i}\right)=\min_{\theta_i}\left\{g\left(\theta\right)\right\}$

and $\bar{\theta}_{-i}=\min_{j\neq i}\theta_j$

Eqns.(9) and (10) might be interpreted as two edges of a 'benefit-charge' analysis, in that for each producer the agency measures the benefit from the zero-charge Groves mechanism and levies the corresponding lump-sum charge for it.

4. Implications

Not only the global income is important but also each producer's income is important and each producer's income must be large enough to match the existence of the agency. On the other hand, the critical values representing the range of income levels are determined by the parameters of production function. Under cost uncertainty, the absolute level of income is an important criterion for establishing an efficient agency with incentive compatibility and individual rationality.

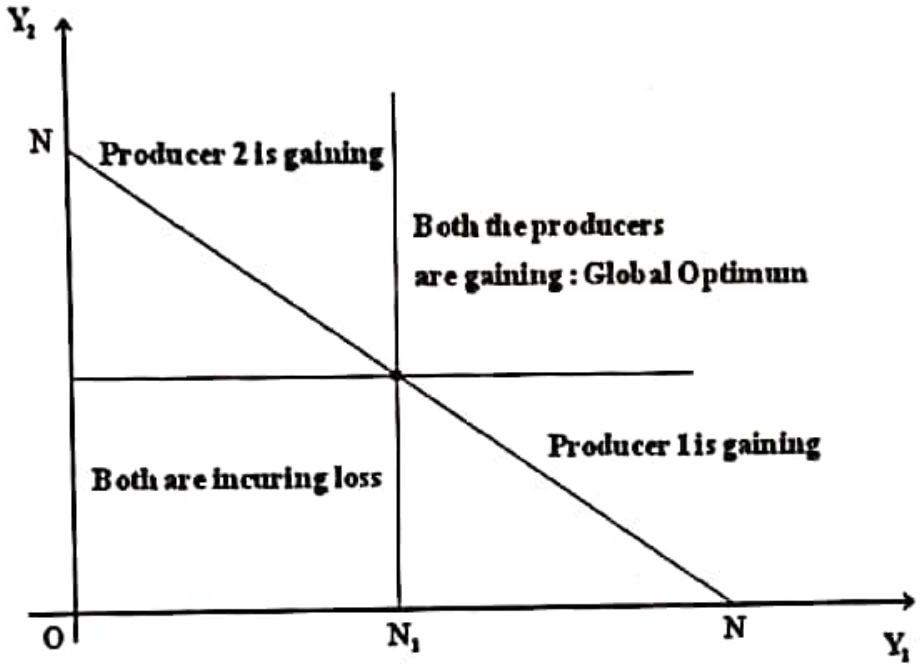

Fig. – 1: Range of output for the existence of incentive mechanism

In the above figure we measure Y_1 production along the horizontal axis and Y_2 production along the vertical axis. Here in the figure we have mentioned four zones. Among these four zones one zone indicate the zone where both the producers are gainers. This zone is also known as the global optimum zone. There are two zones where only one producer is gaining and the other is losing. The fourth zone is the zone where both the producers are the losers. So we can conclude that under uncertainty any of these four cases may occur depending on the efficiency of the agency.

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HUMAN RESOURCE MANAGEMENT IN LIBRARIES

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ABSTRACT:

Emphasises the role of people in fostering productivity, that is, the importance of good human resource management (HRM), in an organisation including a library in the current techno-economic environment. HRM is one of the most important managerial aspects of library. It plays a vital role in the performance, advancement, development of library and helps to recognize the worth of individual employee in the library. This paper mentions the definition, needs, roles and various functions of HRM in the libraries and then proceeds to conclude that good personnel policies and procedures are needed to ensure a library's prosperity and its commitment to the people.

KEY WORDS: Human Resource, Human Resource Management, Libraries.

INTRODUCTION:

There are no simple formulas or recipes for dealing with people. Managing people always requires understanding them as individuals and adapting to their particular wants and needs.

Human Resource refers to the individual or personnel or workforce within an organization responsible for performing the tasks given to them for the purpose of achievement of goals and objectives of the organization. In the libraries, there are so many resources, such as reading materials, human resource and technique resources. But today human resources are acknowledged as the most valuable and important asset in the libraries. These are no longer associated with problems and costs but instead recognized as a valued resource with potential.

DEFINITIONS:

Human Resource Management is a process of bringing people and organizations together so that the goals of each are met. It is part of the management process which is concerned with the management of human resources in an organization. It tries to secure the best from people by winning their wholehearted cooperation. In short, it may be defined as the art of procuring, developing and maintaining competent workforce to achieve the goals of an organization in an effective and efficient manner.

According to the Society for Human Resource Management, it is the
"the design of formal systems in an organization to ensure the effective and efficient use of human talent to accomplish the organizational goals".

According to Edwin B. Flippo " it is planning, organizing, directing and controlling of the procurement, development, compensation, integration and separation of human resources to the end individual, organizational and social objectives are accomplished."

According to Geisler " Human Resource Planning is the process – including forecasting, developing and controlling – by which a firm ensures that it has the right number of people and the right kind of people at the right places at the right time doing work for which they are economically most useful".

AIMS:

Optimum output: The aim of HRM is to maximise output and profit. It is achieved by securing optimum contribution from the staff employed in a library.

Development of workers' capacities: HRM helps the workers to develop their capacities to the maximum so that they contribute to their institution/ library. This is secured by enabling the workers to derive maximum satisfaction from their work.
Development of team spirit: HRM strives to develop *esprit de corps* amongst the workers. They are made to feel that they, as a group have achieved the goal.
Continuous vigilance: It is of continuous nature. It cannot be turned on and off like water from facet; it cannot be practiced only one hour each day or one day a week. It requires a constant alertness and awareness to human relations and their importance in everyday operations.

NEED:
The human resources are assuming increasing significance in modern organization. Obviously, majority of the organization setting are human and social rather than physical, technical or economic. The failure to recognize this fact causes immense loss to the nation, enterprise and the individual. It is a truism that productivity is associated markedly with the nature of human resources and their total environment consisting of interrelated, interdependent and interacting economic and non-economic factors. It is the people who make the difference to any system and hence there is the need to identify and develop high caliber staff. They will ensure better performance and maximize the potential of technologies, facilities, locations and partnerships to provide value added services. There is, a compelling need for a systematic and deliberate planning process to develop not just the collection and services, but more importantly the human resource. They act as a mediator between users and technology by assisting them to tap the vast amount of information in digital form.
For the following reasons human resource management is needed in the libraries –
Capabilities, skills, performance, abilities and potentialities of each individual are evaluated in human resource audit. In many occasions replacement charts or succession planes are kept so that potential executives are located for every position in the organization during the given future period.
Forecasting and auditing provide background information about internal factor like current and expected skills and vacancies. Accordingly manpower planning can be done. Thus, manpower planning must be supported by human resource forecasting, human resource auditing and human resource analyzing.
Planning will help in positioning needed employees at the desired time taking into account the lead time for the process of identifying the shortages, getting the vacancy cleared and going through the selection process. It identifies and develops the personnel to move up and assume greater responsibility.
Changes in the libraries are continuously taking place. Human resource management suggests training and development programmes so that personnel can adapt to these changes.
HRM helps in reducing the cost of production and keep the wheels moving, by providing adequate personnel, utilizing the human resource present in the libraries and effectively controlling and utilizing them.

ROLE:
Human resource management is one of the most complex activities in any library. The library management must balance many competing forces. The challenge of human resource management is to be clear and objective. The management has to clarify which issues are important and should be considered before making a decision. Each consideration should be placed in its proper perspective, and should reach to a balanced, unbiased judgment that serves the organization in the long run. There should be participate and collaboration efforts among the library personnel both at the personal level and group level. The managers must have good understanding of the psychological and sociological forces that affect worker attitude and performance. The people in the library are heterogeneous in varying ages, levels of education, skill and expertise, career expectations, satisfaction characteristics, personalities and interpersonal relationship. The supervisors must understand how these factors interact in work situation in different circumstances. Library management always requires understanding the people as individual and

feels their particular needs and requirements for better performance. Library can prosper only if the human resource i.e. the people working in the library is happy and contented with the library. In order to

give better treatment in the library, the appointment of personnel managers has become essential, who performs managerial as well as operative functions. In all these they have to play an important role in the following area:

To help management, in the preparation, adoption and continuing evaluation of personnel programmes and policies.

To aid management in assuring effective communication throughout the library.

To establish the mechanism for the administration of personnel services that is delegated to the personnel department of library. This includes the maintenance of a stable work force, training and development, working condition, welfare services etc.

To undertake personnel research that will keep management continually informed so that better decisions may be made by management on matters affecting personnel.

To develop an effective appraisal system which will be used by the management to provide a current inventory of manpower resources in the organization.

To maintain a programme of education and training which will provide members of the organization with information required to do various jobs and develop themselves.

FUNCTIONS:

Like other organizations, library of all types have traditional Human Resource Management activities such as recruitment and selection compensation, benefits, training and development, health and safety, employee and labor relations, and, in some libraries, student employment or volunteer management. Within research, national, academic, public and special libraries, the Human Resource functions structured in a variety of ways that reflect such factors as the size of the libraries and its view and philosophy of Human Resources. For some libraries the Human Resource department of parent organization or institution provides some or all Human Resource functions for the libraries. In other libraries individual's positions may be dedicated to Human Resource functions. The functions of Human Resource Management may be grouped under the following broad headings:

JOB ANALYSIS:

Job analysis has long been one of the most basic activities of Human Resource Management. It is a technique for investigating general work assignment or jobs. When the jobs, works, tasks and activities are analysed, they provide very important indicators to access the entire operational process in the library. It very much helps in personnel management because the administration can get the idea and information regarding the task actually being done by the individual employ holding specific job. It helps to understand the step by step procedure of each operation, time required for each job and the work-flow in the library. If there is any bottleneck, it can be identified, located and rectified through job analysis. It also helps to understand and fix up the academic qualification, professional training and expertise for creation of posts and selection of persons for appointment.

JOB DESCRIPTION:

In the context of Human Resource Management in libraries, job analysis leads to job description. A job description is essential for the purpose of recruitment, training needs and later for performance evaluation of the personnel of the libraries. For an employee job description gives a full understanding of the activities to be performed, duties and responsibilities. Once a job, a work and activity is established, a description of these job work and activity has to be written, giving all details about them. The details such as major functions, duties and responsibilities, relationship of each to other units of library, scale of the salary and total emoluments, minimum qualification and experience of the personnel are gives in job description. It varies from library to library.

PERFORMANCE EVALUATION OR APPRISAL:

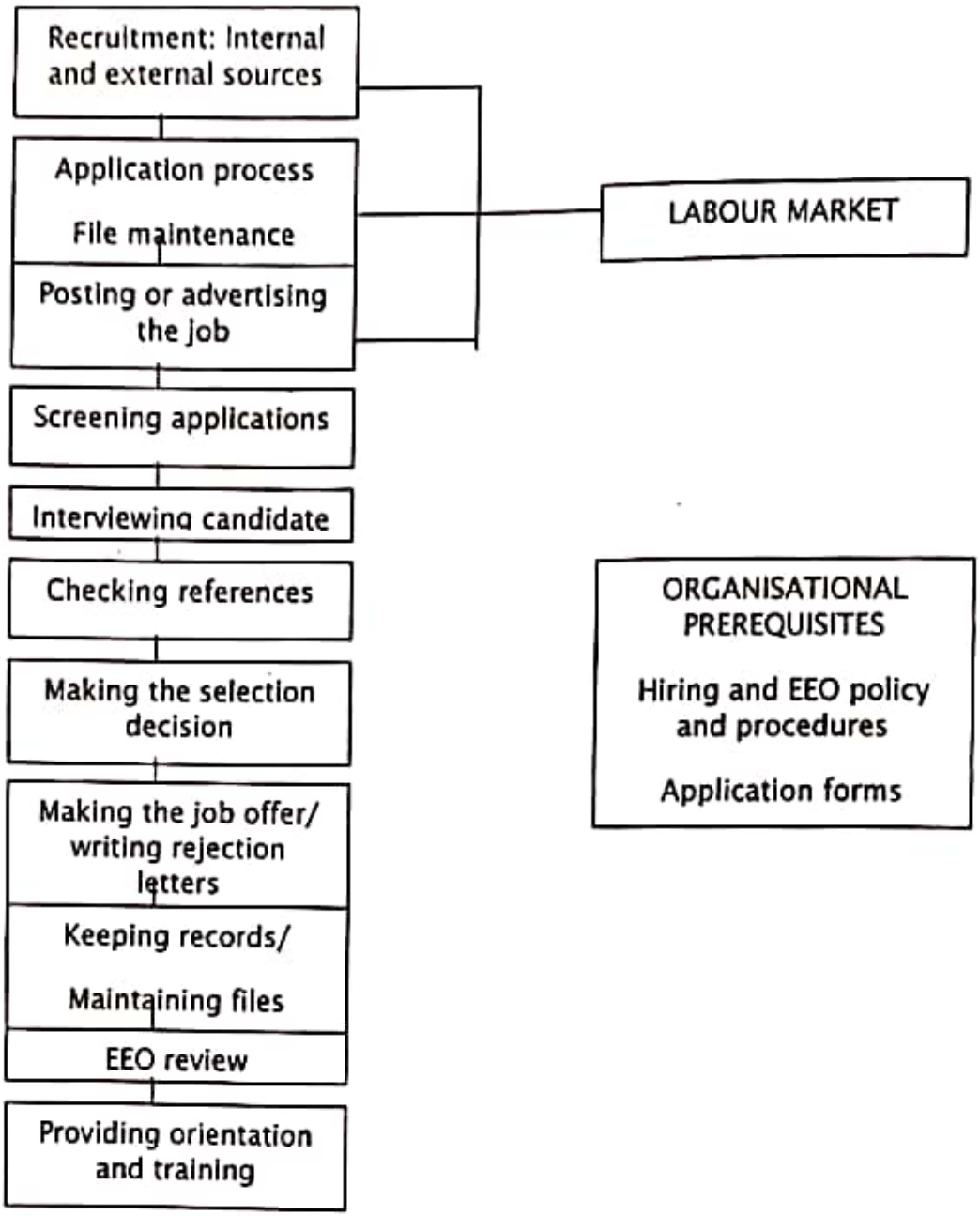
Performance Evaluation means the systematic evaluation of each individual of the library with respect to their performance on the job and their potential for development is concerned with the determination of the differences between the working of various individuals of a library. It employs rating techniques for comparing individual member among the work-group in terms of personal efficiencies or deficiencies and the requirements of their respective jobs. It has become a very significant activity in most of the libraries because it provides data about post, present and expected performance of the staff members which is helpful in taking decision on selection, training and development, increase in pay, promotion, transfer and the like.

HIRING PROCESS, RECRUITMENT AND SELECTION:

Hiring is an expensive process, and a mistake can prove even more expensive, the employer must regard this process as one of its most important function. Before an organization begins hiring, certain structural process should already be in place: written policies, application forms, equal employment opportunity (EEO), monitoring systems and interview training programmes. The need for a consistent and substantial pool of applicants is basic to the survival of any organization. For this reason, the library establishes processes and policies for recruiting and hiring new staff. Because employee selection is such an important activity, it is best that recruitment be done in systematic fashion that is consistent with the organization's goals. The strategy used and the time and fiscal resources devoted to recruitment should reflect an objective assessment of the library's needs. In the fiscal analysis, the library must try to match the wants and need of employees with those of the organisation. It is useless to recruit individual who are not 'fitted' to library work, even if they are hard workers.

Methods of recruitment vary widely and reflect factors such as many or few available workers, turnover rate of the library, and need to recruit equal employment opportunity purposes. External sources of recruitment are : i) consultants, ii) professional associations and conferences, iii) library schools, iv) local employment v) local high school and colleges, vi) the library personnel officer, vii) other libraries, and viii) training and vocational schools. Internal sources of recruitment are : i) internal promotional programmes, ii) library scholarship or financial aid, and iii) word of mouth. Media is an obvious tool for recruitment. Such media are : i) radio and television,
ii) internet, and recruitment circulars.

The Following figure presents a tentative model of the hiring process.



Model of the hiring process

The selection of employees is crucial in any organisation and especially in labour-intensive ones. A selection process includes five activities:

i) Interviewers must be selected;
ii) Candidates must be selected from a pool of applicants using the application form, resume, and references;
iii) Individuals must be interviewed;
iv) Selection decision must be made; and
v) The candidate must be informed as to their selection or rejection.

The job interview is the most common technique for the selection of employees in libraries and other organisations, and plays an important role in the final determination.

PLACEMENT:

Placement implies the assignment of a right job to the right person. Proper placement is instrumental in increasing output. It avoids wastage of human energies which may occur by absenteeism or accident. It gives a fillip to employee's morale. On the other hand, a misplaced employee is a liability to the library and can cause damage to machinery and other equipment.

INDUCTION:

Induction means introducing a new worker to their job, co-workers and basic objectives and policies of the library. This kind of initiation is helpful for an employee in settling their self to their new job. This can be achieved by supplying the new employee all relevant information about their job and the library through printed/written documents and verbal explanation by their immediate supervisor.

TRAINING:

A prospective employee must be properly trained for performing particular job/jobs. This will help them to know the peculiarities of the job conditions of a particular library. In this fact changing society, the training in the use of new gadgets and machines is very essential. The output of a trained worker is better, both qualitatively and quantitatively than that of an untrained one.

Training may be imparted through many methods such as apprentice system on the job training, Understudy method, Role – Playing technique, Utility Squad or Flying Squad method, Educational Excursion method, and other audio-visual method.

COMPENSATION, CLASSIFICATION, AND BENEFITS:

Libraries differ greatly in terms of their size and organizational complexity. For this reason, it is difficult to discuss job classification and compensation systems generally. Small libraries with few staff members have relatively little need to codify differences in job tasks, nor are subtleties usually required in the assignment of pay. In large libraries, there is often considerable sophistication in the specialization and departmentalization of tasks. Under these circumstances, refined job classification and compensation systems are needed and an outside expert may be required to design the system properly.

Job classification and compensation systems are very important because such systems identify the basic tasks for each job, establish specific level of jobs, and assign monetary ranges to these levels. Employees' job task plays a very important role in their overall satisfaction and commitment, but the pay they receive can also seriously affect their attitude towards work. Libraries must therefore, devote considerable energy to ensuring that job classification and compensation systems are well designed and fair.

An important component to salary compensation is employ benefits. This often overlooked aspect of human resource management can have a substantial impact on employees and the organization both in terms of employ motivation, and in terms of fiscal health. Employees also perceive benefits in different ways. Many see them as a part of job security and as a right. Benefits are perceived as part of the employer-employee 'exchange relationship'; their purpose is to provide assistance in case of injury or illness, and to increase the quality of employee's work life.

EMPLOYEE RETENTION AND TURNOVER:

When workers are dissatisfied, unmotivated, uncommitted, or unproductive, a common result is employee turnover. When an employee resigns or is terminated, it is a turnover. This process can prove both

expensive and damaging to library services. For this reason, the subjects of worker retention and turnover are important.

CONCLUSION:

Librarianship is a service industry, and it cannot function without staff to manage information and serve the users of that information. Therefore a successful library is very much dependent on the staff or Human Resource that implements and carries out the service. Developing individual skills in all levels of employees to work efficiently and effectively in team structures has become more critical as libraries face the reality of smaller work forces, hiring freezes, unskilled personnel and labor shortage. Libraries seek to restructure organizations, redesign jobs and work, improve processes and workflow, use its resources wisely and increase performance capabilities in order to enhance the organization's ability to survive and thrive in a world of change and this is possible only through proper Human Resource Management in the Libraries.

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A SERIOUS ENVIRONMENTAL CONCERN ABOUT BIO MEDICAL WASTE: APPROACH FOR MANAGEMENT

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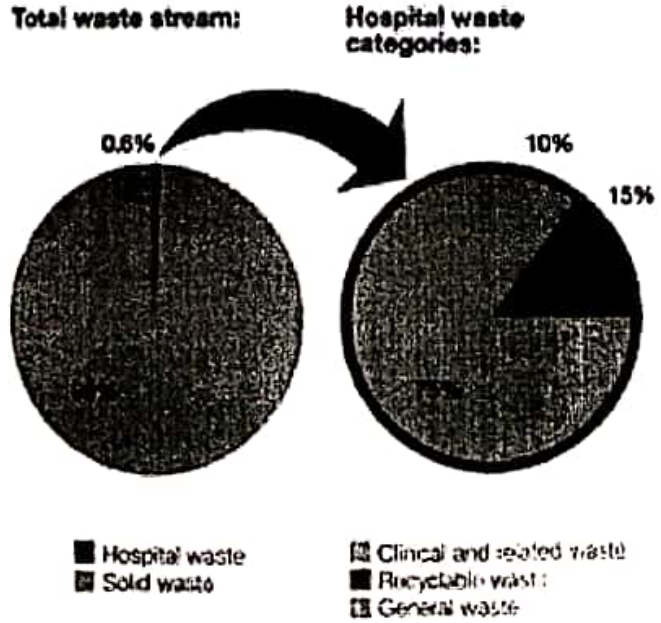
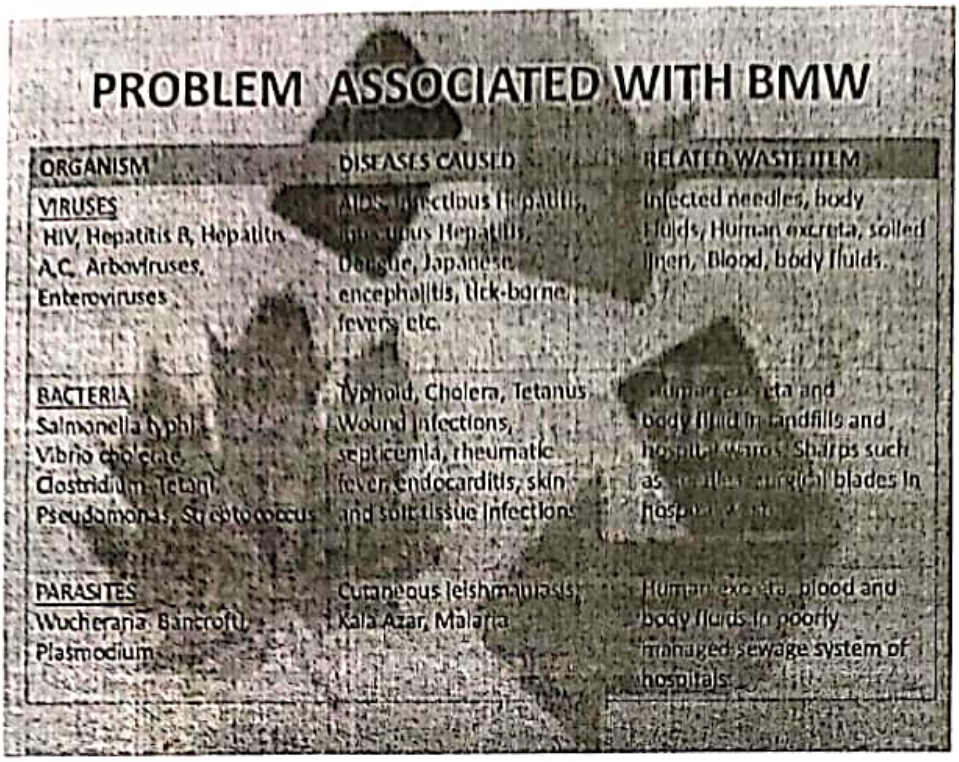
Abstract:
Biomedical waste generated by health care activities includes a broad range of materials, from used needles and syringes to soiled dressings, body parts, diagnostic samples, blood, chemicals, pharmaceuticals, medical devices and radioactive materials.
Poor management of health care waste potentially exposes health care workers, waste handlers, patients and the community at large to infection, toxic effects and injuries, and risks polluting the environment. It is essential that all medical waste materials are segregated at the point of generation, appropriately treated and disposed of safely.

Introduction:
BioMedical Waste, (BMW), is considered as solids, liquids, sharps, and laboratory waste that are potentially infectious or dangerous and is a potential health hazard to the health care workers, public and flora and fauna of the area. Every day thousands of tons of infectious medical waste are being produced globally.
It is true fact that hospital is a place for the treatment of sick persons but we never seriously think about the adverse effects of the garbage and filth generated by them on human body and environment. Hospital acquired infection, transfusion transmitted diseases, rising incidence of Hepatitis B, and HIV, increasing land and water pollution lead to increasing possibility of developing many diseases. Air pollution due to emission of hazardous gases by incinerator such as Furan, Dioxin, Hydrochloric acid etc. have compelled the authorities to think seriously about hospital waste and the diseases transmitted through improper disposal of hospital waste.
Hospital waste is very different from the ordinary waste that is produced in our homes on a daily basis that is why we need to adopt certain different methods for disposing off the hospital waste materials. Various complex substances are involved when it comes to the hospital waste.





This problem has now become a serious threat for the public health and, ultimately, the Central Government had to intervene for enforcing proper handling and disposal of hospital waste and an act was passed in July 1996 and a bio-medical waste (handling and management) rule was introduced in 1998.

Regulation by country:

Europe

In Europe, wastes are defined by their European Waste Catalogue (EWC) Codes. EWC Codes are 6 digits long, with the first two digits defining the overarching category of waste, the next two defining the sub-category, and the last two defining the precise waste stream. Clinical waste comes under the "18" codes, for example: "18 01 01" corresponds to healthcare waste (18), from humans (01), that is sharp and not infectious [01].

United Kingdom

In the United Kingdom, handling procedure of clinical waste is closely regulated. Applicable legislation includes the Environmental Protection Act 1990 (Part II), Waste Management Licencing Regulations 1994, and the Hazardous Waste Regulations (England & Wales) 2005, as well as the Special Waste Regulations in Scotland.

United States

In 1988 the Federal government passed The Medical Waste Tracking Act in order to create standards for governmental regulation of medical waste. After the Act expired in 1991, States were given the responsibility to regulate and pass laws concerning the disposal of medical waste.

India

The Government of India put forward legislation on 20th July 1998 under section 6, 8, 25 of the Environment protection Act 1986. The rule defines Administrative Medical Officer of health care facilities as Bio medical waste generators & fix responsibilities on them for developing an effective waste disposal mechanism for the waste they generate. The rule spells out treatment & disposal options for various categories of Bio medical waste. At state level the State Pollution Control Board is the regulatory body, which monitors the proper implementation of the rules.

Classification of hospital waste:

(1) General waste: Largely composed of domestic or house hold type waste. It is non-hazardous to human beings, e.g. kitchen waste, packaging material, paper, wrappers, plastics.

(2) Pathological waste: Consists of tissue, organ, body part, human foetuses, blood and body fluid. It is hazardous waste.

(3) Infectious waste: The wastes which contain pathogens in sufficient concentration or quantity that could cause diseases. It is hazardous e.g. culture and stocks of infectious agents from laboratories, waste from surgery, waste originating from infectious patients.

(4) Sharps: Waste materials which could cause the person handling it, a cut or puncture of skin e.g. needles, broken glass, saws, nail, blades, scalpels.

(5) Pharmaceutical waste: This includes pharmaceutical products, drugs, and chemicals that have been returned from wards, have been spilled, are outdated, or contaminated.

(6) Chemical waste: This comprises discarded solid, liquid and gaseous chemicals e.g. cleaning, house keeping, and disinfecting product.

(7) Radioactive waste: It includes solid, liquid, and gaseous waste that is contaminated with radionucleides generated from in-vitro analysis of body tissues and fluid, in-vivo body organ imaging and tumour localization and therapeutic procedures.

Approach for hospital waste management:

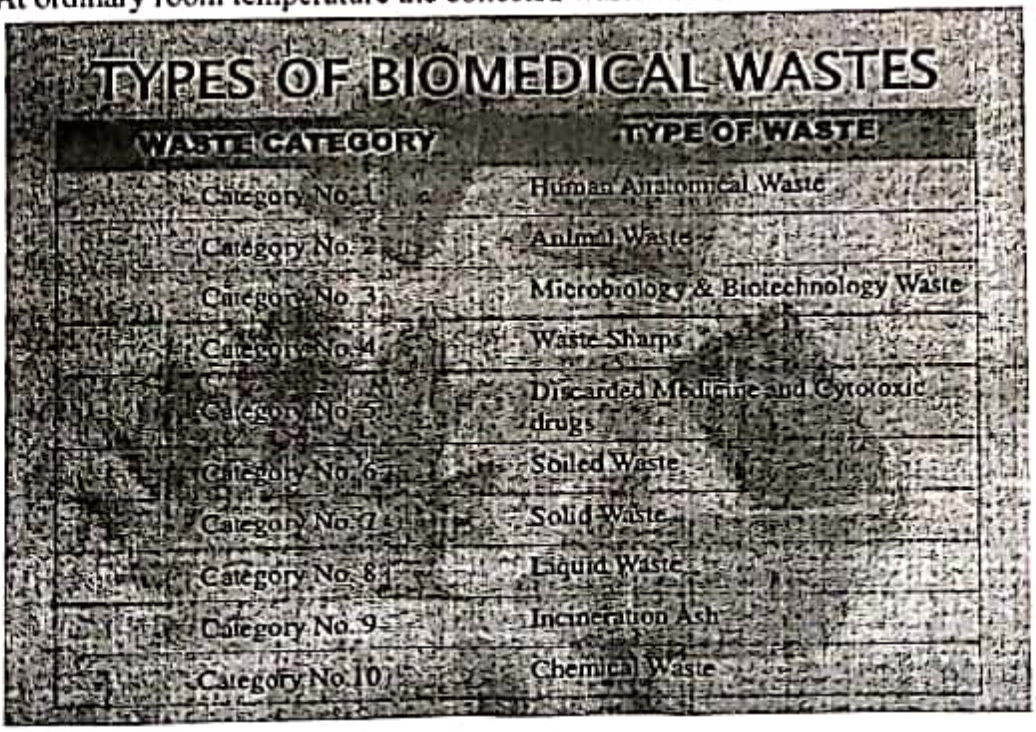
Hospital waste management is based on Bio-medical Waste (Management and Handling) Rules 1998, notified under the Environment Protection Act by the Ministry of Environment and Forest (Government of India).

1. Division of waste

Before the hospital waste is decomposed it is important to treat it with certain chemicals. Different categories of waste materials are divided into diverse sections so that they can be treated accordingly. It is a very important step that should be carried out at the place of generation of the waste. This activity should be carried out at diagnostic services areas, labour rooms, operations theatres, activity areas. Hygiene should be maintained at all time while treating the waste materials. The biomedical waste should be segregated as per categories mentioned in the rules.

2. Collection of bio-medical waste

Collection of bio-medical waste should be done as per Bio-medical waste (Management and Handling) Rules. At ordinary room temperature the collected waste should not be stored for more than 24 hours.



Type of container and colour code for collection of bio-medical waste

Type of Waste	Color of the box	Categories involved	Type of Container
Human anatomical waste, animal waste, microbiology and biotech. waste & soiled waste	Red	Cat 1, Cat 2, Cat 3 & Cat 6	Plastic bag
Microbial and biotech waste & solid waste		Cat 3, Cat 6 & Cat 7	Disinfected container/plastic bag
Waste Sharps		Cat 4, Cat 7	Plastic bag /Puncture proof container
Discarded medicines and cytotoxic drugs, Incinerator ash & chemical waste	Black	Cat 5, Cat 9 & Cat 10 (solid)	Plastic bag

3. Transportation

Once the waste is divided into the different categories the next step involves the transportation of the waste matter from the place of origin to the place of decomposition. Bio-medical waste that is obtained from the hospitals should be treated separately and should never be mixed with the general waste. This reduces the chances of any disease.

Within hospital, waste routes must be designated to avoid the passage of waste through patient care areas. Separate time should be earmarked for transportation of bio-medical waste to reduce chances of it's mixing with general waste. Desiccated wheeled containers, trolleys or carts should be used to transport the waste/plastic bags to the site of storage/ treatment.

Trolleys or carts should be thoroughly cleaned and disinfected in the event of any spillage. The wheeled containers should be so designed that the waste can be easily loaded, remains secured during transportation, does not have any sharp edges and is easy to clean and disinfect. Hazardous biomedical waste needing transport to a long distance should be kept in containers and should have proper labels. The transport is done through desiccated vehicles specially constructed for the purpose having fully enclosed body, lined internally with stainless steel or aluminium to provide smooth and impervious surface which can be cleaned.

4. Treatment of hospital waste

Treatment of waste is required:

to disinfect the waste so that it is no longer the source of infection.

to reduce the volume of the waste.

to make waste unrecognizable for aesthetic reasons.

to make recycled items unusable.

4.1 General waste

The 85% of the waste generated in the hospital belongs to this category. The, safe disposal of this waste is the responsibility of the local authority.

4.2 bio-medical waste: 15% of hospital waste

a) *Deep burial:* The waste under category 1 and 2 only can be accorded deep burial and only in cities having less than 5 lakh populations. Burial must be performed under close and dedicated supervision.

b) *Autoclave and microwave treatment:* Microwaving utilises electromagnetic, microwaves that enter into or penetrate materials. Microwaving treatment shall not be used for cytotoxic, hazardous or radioactive wastes, contaminated animal carcasses, body parts and metal items. The microwave should completely and consistently kill the bacteria and other pathogenic organisms that are ensured by approved biological indicator at the maximum design capacity of each microwave unit.

The autoclave should be dedicated for the purposes of disinfecting and treating biomedical waste.

c) *Shredding:* The plastic (IV bottles, IV sets, syringes, catheters etc.), sharps (needles, blades, glass etc) should be shredded but only after chemical treatment/microwaving/autoclaving. Needle destroyers can be used for disposal of needles directly without chemical treatment.

d) *Secured landfill:* The incinerator ash, discarded medicines, cytotoxic substances and solid chemical waste should be treated by this option.

e) *Incineration:* The most reliable and commonly used treatment process for health-care waste is double – chamber incineration. The incinerator of this kind mainly comprises of a chamber where the waste is thermally decomposed through an oxygen deficient, medium-temperature combustion process (800-900¡ C), producing solid ashes and gases. The chamber includes a fuel burner, used to start the process. The waste is loaded in suitable bags or containers. The gases produced in this way are burned at high temperature (900-1200°C) by a fuel burner in the post-combustion chamber, using an excess of air to minimize smoke and odours. Their ashes will contain less than 1% unburnt material, which can be disposed of in landfills. However, to avoid dioxin production, no chlorinated plastic bags (and preferably no other chlorinated compounds) should be introduced into the incinerator, and should therefore not be used for packaging waste before its incineration.

Waste that should not be incinerated:

- Pressurized containers. Explosion may occur and cause damage to the equipment.
- Haloginated plastics (e.g. PVC). Exhaust gases contain hydrogen chloride and may contain dioxins.
- Wastes with high content of heavy metals (e.g. thermometers, batteries). Incineration will cause emission of toxic metals (e.g. lead, cadmium, mercury) into the atmosphere.

The solid wastes containing Mercury due to breakage of thermometer, pressure and other measuring equipment in HCUs need to be given proper attention not only in respect of the collection of the spilled mercury, its storage and sending of the same back to the manufacturers, but also taking of all measures to ensure that the spilled mercury does not become part of biomedical wastes or other solid wastes generated from HCUs.

5. Types of hazards to health care personnel:

i) Needle stick injuries, cuts and bruises from blades and other sharp instruments in healthcare establishments can lead to severe infection and death among healthcare personnel.
ii) Infections can also be contracted due to contact with patients, blood, sputum, urine, stools and other body fluids.
iii) Allergy due to fumes and particulate matter and hazards while administering radioactive and cytotoxic treatment can also cause disability and death among healthcare workers.

6. Safety measures:

i) The production, segregation, transportation, treatment and disposal of health care waste involve the handling of potentially hazardous material and therefore protection against personal injury is vital for all workers who are at risk. Protection like helmets, face masks, eye protectors, industrial aprons, leg protectors, disposable gloves are minimum requirement for the purpose.
ii) The drivers, collectors and other handlers are aware of the nature and risk of the waste and written instructions must be provided regarding the procedures to be adopted in the event of spillage/ accidents.
iii) They must be protected by vaccination against tetanus and hepatitis B.

7. Training on Hospital waste management:

Each and every hospital must have well planned awareness and training programme in appropriate language/medium and in an acceptable manner for all category of personnel including administrators (medical, paramedical and administrative).
The training programme should definitely include the following:
(i) Awareness of different categories of waste and potential hazard
(ii) Waste minimization, reduction in use of disposables
(iii) Segregation policy
(iv) Proper and safe handling of sharps
(v) Use of protective gear
(vi) Colour coding of containers
(vii) Appropriate treatment of waste
(viii) Management of spills and accidents
(ix) Occupational health.

Conclusion:

The management of "Bio-Medical Waste" is a subject of considerable concern to public health and infection-control specialists, as well as the general public. It is a well-known that in several types of health care activities, various types of hazardous and contagious materials are generated. Even though the consequences of discarding such waste carelessly are well known, it is only recently that adequate initiatives to manage this waste in a scientific manner are being taken in India. Unscientific disposal of health care waste may lead to the transmission of communicable diseases such as gastro-enteric infections, respiratory infections, spreading through air water and direct human contact with the blood and infectious body fluids. These could be responsible for transmission of Hepatitis B, C, E and AIDS within the community. So it is essential to take care of the Bio-Medical Waste management and awareness is the key to such success. The search for cost effective and environmental friendly technology for treatment of bio-medical and hazardous waste is very important.

Acknowledgement

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A comprehensive study as to jurisprudence governing sustainable development in India

DR. SUBIR KUMAR ROY[1]

ABSTRACT

Sustainable development lies in between the two extremes of 'no growth' and 'unlimited growth' which ensures optimization of utilization and equitable distribution of natural resources. The sustainable development conceived of as integrating three subjects, which are environmental law, human rights law and economic law. The effective coordination of these three can only effectuate the concept of sustainable development.

UN is consciously trying to implement the concept of sustainable development through number of covenants, treaties, conventions etc. and the first concerted attempt manifested through the Stockholm Declaration, 1972. Since then a number of initiatives are taken under the aegis of UN like the Nairobi Declaration, 1982, Rio Declaration, 1992, Kyoto Protocol to the Un Framework Convention on Climate Change, 1997, The Johannesburg Declaration on Sustainable Development, 2002, The Delhi Ministerial Declaration 2002 etc.

So far the Indian legal system is concerned the protection of environment got the Constitutional status here. Beside constitutional provisions a number of legislation have been enacted and among them some legislation are proved very much effective to ensure sustainable development

So far the Indian judiciary is concerned it has engaged itself in creating a new environmental jurisprudence which is full of values for preservation and conservation of total environment. But still our legal system has not matured enough to materialize above in its letter and spirit. This paper aims to make a comprehensive study about the present legal mechanism regarding Sustainable development and to provide the concrete suggestions to rock solid the position of above.

Key Words: Sustainable Development, Legislations, Stockholm Declaration, Rio Declaration, Climate, Poverty, Inclusive Growth, Planning, Food Security

1. The Concept of Sustainable Development

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Development has often been reckoned in terms of economic growth. This is an age old concept that the policies which led to growth are happens to be pro development and good. The underlying object behind this idea is to generate wealth rapidly for ensuring prosperity as it widens the 'realm of possibilities." But this model of development never considers the depletion of natural resources and its adverse impact upon environment. Development without considering its impact upon nature can be proved disastrous and if continued any more whole race of human being may be extinct. The menace of environmental pollution has taken a gigantic shape throughout the globe and presence of the above can be felt in terms of the incidents of growing global warming, frequent climate change, increasing stress on resources and environmental system, loss of biodiversity etc. Under the above circumstances, it is a great challenge before the world polity to how to meet the needs of the present generation without diminishing the capacity of the future generation to meet their own. Sustainable development is the only solution to come out from this situation because it not only recognises the right to development of the present generation but of future too.

Sustainable development lies in between the two extremes of 'no growth' and 'unlimited growth' which ensures optimization of utilization and equitable distribution of natural resources. Sustainable growth establishes the interactions in between the society, environment and economic growth with a holistic approach. The cardinal philosophy of sustainable development is to meet the basic human needs, minimizing its negative impact on environment. The edifice of sustainable development stands on the integration of both the developmental and environmental imperatives. The sustainable development conceived of as integrating three subjects, which are environmental law, human rights law and economic law. The effective coordination of these three can only effectuate the concept of sustainable development.

Thus, in modern times sustainable development is being perceived as a development paradigm both in terms of process and outcome. It can only be achieved through integration in between human rights and democracy. Economic and social development is essential for ensuring a favourable living and working environment for man and for creating conditions on earth that are necessary for man and for creating conditions on earth that are necessary for the improvement of

the quality of life.[2] Sustainable development intends to ensure a balanced and positive development. Principle 13 of Stockholm Declaration on the Human environment, 1972 states, "In order to achieve a more rational management of resources and thus to improve the environment, states should adopt an integrated and co-ordinated approach to their development planning so as to ensure that development is compatible with the need to protect and improve the human environment for the benefit of their population. Sustainable development is a kind of holistic strategy for development that embraces all human rights i.e. economic, cultural, civil and political. Principle 1 of the Rio Declaration on environment and Development, 1992 proclaims that human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature. Rio Declaration further proclaims that the right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations[3] and it also recognises that peace, development and environment protection are interdependent and indivisible[4].

Poverty, environmental degradation and population growth are closely associated and linked with each other and none of these problems can be addressed in isolation except adopting the process of sustainable development which demands to meet the human needs both by increasing productive potential, through ensuring equitable access of all to the constrained resources and by technological innovation which should have the potentiality to curb the menace of environmental degradation. The core idea of sustainable development emanates from the very believe that man is both creator and moulder of his environment, which gives him physical sustenance and affords him the opportunity of intellectual, moral, social and spiritual growth...[5] however to provide any uniform definition of sustainable development remains a challenge for all actors in the development process. In essence, it is a new concept of economic growth which tells of adoption of a process of change in exploitation of natural resources, economic and fiscal policies, the orientation of technological development so that to evolve a new paths that are economically, socially and ecologically sustainable.

2. The Genesis of Sustainable Development

2. Principle 8 of Stockholm Declaration on the Human Environment, 1972
3. Principle 3 of The Rio Declaration on Environment And development, 1992
4. Ibid, Principle 18
5. Proclamation 1 of Stockholm Declaration on the Human Environment, 1972

The credit for introducing the term 'sustainable' into political domain goes to the Club of Rome which published the epoch making report on the 'limits of growth' written by a group of scientists under the leadership of Dennis and Donella Meadows of the Massachusetts Institute of Technology (MIT) in March 1972. In this report it had been suggested to alter growth trends and to establish a condition of ecological and economic stability that is sustainable for into the future.

In the same year the Stockholm Declaration on Human Environment has provided the rock solid foundation to the concept of sustainable development by acknowledging the relationship what exist in between the development and conservation of environment. The Stockholm Declaration, 1972, which was the first concerted attempt of the world polity under the aegis of UN suggested that it should be an imperative goal for mankind to defend and improve the human environment for present as well as future generation and which can be achieved in harmony with the established and fundamental goals of peace and of economic and social development. It has been made clear that the claim of pollution free environment has to be considered as a pragmatic reality and all sovereign states are supposed to ensure pollution free environment by taking appropriate measures.

Though, Stockholm Declaration gave emphasis on creation of human environment but not discussed about the sustainable development directly. The term 'sustainable development' as a whole was introduced by the 'International Union for the Conservation of Nature' in the year 1980 in its 'World Conservation Strategy' and has been popularized through Brundtland Commission Report under the heading of 'our common future' made in the year 1987. Sustainable development is defined in the above report as 'development' which meets the needs of the present generation without compromising the ability of future generations to meet their own needs. According to this report Development involves a progressive transformation of economy and society and physical sustainability cannot be achieved unless development policies pay attention to the matters related to access to resources and in the distribution of costs and benefits. According to *Our Common Future,* the world must grapple simultaneously with four interlocking crises 1) rapid population growth that will increase existing poverty- 90% of the growth will be in the poorest countries, and 90% of that growth will occur in already

overburdened cities; 2) economic growth, which consumes natural resources, creates pollution burdens, and which, because of international economic relationships, creates enormous pressure to minimize environmental management in developing countries; 3) ecological problems arising from soil erosion, water pollution and availability, atmospheric pollution, climate modifications, deforestation, and biodiversity diminishment; and 4) the borrowing of environmental capital from future generations with no intention of or prospect of repayment.[6]

Since then the UN is consciously trying to implement the concept of sustainable development through number of covenants, treaties, conventions etc. like the Nairobi Declaration, 1982, Rio Declaration, 1992, Kyoto Protocol to the Un Framework Convention on Climate Change, 1997, The Johannesburg Declaration on Sustainable Development, 2002, The Delhi Ministerial Declaration 2002 etc. Under Art.68 of the UN Charter, the UNESCO has set up UN commission on Sustainable Development in order to enhance the international cooperation and rationalize inter-governmental decision making capacity so that the issues of environment and development can be integrated.

It is worthwhile to mention that sustainable development entered the global platform during the 1992 through the 'Earth Summit' held in Rio de Janeiro. Rio summit was a kind of strategic development of the United Nation to shape and save the future of the 'blue planet' by ensuring balance in between the use and the preservation of resources of the nature. Being influenced by the 'Brundtland Report' the Earth Summit vowed to establish a new and equitable global partnership by enhancing co-operation among the states, key sectors of societies and people. It rated the human being at the center of concerns for sustainable development and realizes that they are entitled to have healthy and productive life in harmony with nature. World interest in sustainability accelerated at the 1992 UN Conference on Environment and Development in Rio de Janeiro. It consists of two international agreements, two statements of principles and a major action agenda on worldwide sustainable development:

- The Convention on Climate Change – imposes restrictions on the emissions of the greenhouse gases especially carbon dioxide (CO2) and methane (CH4).

6 J. Ronald Engel, *Introduction: The Ethics of Sustainable Development, In* THE ETHICS OF SUSTAINABLE DEVELOPMENT1, 2 *a.* Ronald Engel & Joan Gibb Engel eds., *1990).*

- The Convention on Biological Diversity – bestows responsibility upon the states to conserve species diversity and to use biological resources in a sustainable way.
- The Rio Declaration and the Forest Principles - sets out the principles of sustainable development and proclaims to reduce deforestation.
- Agenda 21 - outlines a plan for achieving sustainable development in the 21st century that calls on countries to reduce pollution, emissions and the use of precious natural resources. It is the most important document signed by the member states at Rio, perceived as a lengthy blueprint for realizing sustainable development.

The Johannesburg Declaration on sustainable Development, 2002 provides a political base to the concept of sustainable development and to some extent redefined the concept evolved in Rio as it tried to establish a link in between poverty, environmental protection and natural resources. It was a biggest ever UN conference where 191 states participated. Johannesburg Summit expressed concern in its final political statement about the deep fault line that divides human society between the rich and poor and the ever increasing gap in between the developed and developing world as it poses a major threat to global prosperity, security and stability. The said summit was committed to build a humane, equitable and caring global society cognizant of the need for human dignity for all. The Declaration clarified that sustainable development is built on three "interdependent and mutually reinforcing pillars" - economic development, social development, and environmental protection - which must be established "at local, national, regional and global levels. The Declaration for the first time affirms that the rich diversity of our planet will be used for achieving common goal of sustainable development.

Twenty years after the iconic Earth Summit, sequel of Rio Summit, 1992 and popularly known as Rio + 20, held in the same city, to chart a new path for sustainable development to raise people out of poverty and to protect the natural world. Under the heading 'The future we want' the world polity aimed to renew the progress of sustainable development and to ensure the promotion of an economically, socially and environmentally sustainable future for all. But needless to mention it failed to follow up the basic philosophy and concept of Earth summit.

1992. The theme of Rio+20 is the incorporation of the concept of 'green economy' which is a contested concept and the critiques apprehend that it may downplay the concept of sustainable development and if that will become true then that may be very alarming and crucial for the protection of the environment for the future.

However the concept of sustainable development sufficiently broadened the scope and gamut of existing International Law and the above proposition get further impetus when we see the ICJ (International Court of Justice) applied the above concept in the case concerning Gabcikovo Nagymaros Dam[7] where the said court gave emphasis upon the need to reconcile economic development with protection of the environment.

In 1996, the International Court of Justice in its Advisory Opinion on the question regarding Legality of the Threat or Use of Nuclear Weapons recognized the principle of State responsibility for environment damage.

Despite of having a number of conventions, treaties, and covenants etc. still the menace of pollution is lurking in our planate just like a gigantic shape. This is a grim reality that the Bio-diversity Convention could not prevent the extinction of one fifth of all species and despite of having Kyoto Protocol on Climate Change we are still bearing the curse of global warming and in such an extent where the existence of whole human race is at peril. USA, the biggest contributor to green house gases refused to accept Kyoto Protocol and these types of instances make it clear that the serious drawbacks of International environmental law is lack of enforceability. In Rio declaration the Industrialised states resolved to provide financial and technological help to developing countries to combat the problem of environmental pollution but the recent economic depression prevented the industrialized world to extend these sort of commitment in Rio+20 which may give birth to a very unbecoming situation in near future.

3. The Sustainable Development and Indian Legal Scenario

3.1 Sustainable Development & Indian Constitution

7. ICJ Rep. (1997),7 at para, 140

So far the Indian legal system is concerned the protection of environment got the Constitutional status here. Though the term 'sustainable development' has not been used anywhere in the constitution but so far the spirit of our constitution is concerned it never supports development in isolation without caring for protection and improvement of environment. The very Preamble of our Constitution gives the guarantee of tripartite picturesque of justice i.e., Justice – Social, economic and political in order to inform the full and free development of every individual. It is needless to mention that without attaining the concept of sustainable one cannot develop his personality to the fullest extent. Art 48 A and Art 51- A (g) is inserted into the Constitution with a view to give a concrete shape for building the environmental jurisprudence of this country. Art.48A imposes duty upon the state and 51-A (g) upon the citizen to protect the environment. However in the original constitution itself, lots of provisions are there which deals with the matter of environment directly or indirectly like Art.39 (e) which states that state must protect the health and strength of workers, men, women and child, Article 47 enjoins upon the State to raise the level of nutrition and the standard of living and to improve public health etc. Though the 'Right to wholesome environment' has not been guaranteed as fundamental right separately but after logical outcome of Ms Maneka Gandhi's[8] ruling on due process, fairness and reasonableness 'Right to Clean Environment 'subsumed within the extended 'Right to Life'.

3.2 Statutory provisions in India to effectuate the goal of Sustainable Development

Beside constitutional provisions, a number of legislations have been enacted and among them some are proved very much effective to ensure sustainable development such as The Environmental (Protection) Act, 1986, The (Wildlife Protection Act), 1972 and its amendments in 1991, 2002, , Biological Diversity Act, 2002, ,Forests Rights Act, 2006 Energy Conservation Act, 2001,The Electricity Act, 2003, Public Liability Insurance Act, 1991 National Green Tribunal Act, 2010 Right to Information Act, 2005, Forest (Conservation) Act, 1980 etc.

The Environmental (Protection) Act, 1986 intends to inculcate environment ethics in every citizen. In the wake of the Bhopal tragedy and to further implement the principles taken in Stockholm declaration 1972 a more comprehensive, bolder and general piece of legislation is

8. . AIR 1978 SC 594

enacted in the year 1986 titled as The Environment (Protection) Act, 1986. The new Act for the first time attempt to lay down comprehensive law on environment and goes beyond the gamut and scope of the Water Act, 1974 and Air Act 1981. The Act was enacted for the purpose of the protection of environment, regulation of discharge of environmental pollutants and handling of hazardous substances, speedy response in the event of accidents which have the potentiality to pose threat to the environment and deterrent punishment to those who endanger human environment, safety and health. On the basis of this Act the various rules are formulated to effectuate the concept of sustainable development. Some of them are, The Environment (Protection) Rules, 1986, The Hazardous Wastes (Management and Handling) Rules, 1989, The Manufacture Storage and Import of Hazardous Chemicals Rules, 1989, The Chemical Accidents (Emergency Planning Preparedness and Response) Rules, 1996, The Bio-Medical Waste (Management and Handling) Rules, 1998, The Recycled Plastics Manufacture and Usage Rules 1999, The Noise Pollution (Regulation and Control) Rules, 2000, The Ozone Depleting Substances (Regulation and Control) Rules, 2000, The Municipal Solid Wastes (Management and Handling) Rules, 2000, The Batteries (Management and Handling) Rules, 2001 etc.

The Indian Forest Act, 1927 being a colonial legislation reflexes the exploitative intentions of the colonial and feudal society rather than the protection of forest and ecology. In order to curb deforestation and to maintain ecological balance The Forest (Conservation) Act 1980 and to codify rights of the traditional forest dwellers the Forests Rights Act, 2006 have been enacted.

By virtue of Art.252 on requests of the states the Parliament has passed the Wildlife (Protection) Act 1972 for the purpose of protecting, propagating or developing wild animals, birds and plants and for matters connected therewith or ancillary or incidental thereto with a view to ensuring the conservation and protection of ecology of this country.

Public Liability Insurance Act, 1991 is enacted with an intention to provide immediate relief to the victims of any accident occurs while handling any hazardous substances and based on the principle of 'absolute' or 'no-fault' liability where every avocations or industries carrying the hazardous substances and earning the profit at the cost of the security of the life and property of the people are required to take insurance coverage not less than the amount of the paid up capital but not more than 50 crore.

The Energy Conservation Act, 2001 has been enacted with an intention to conserve and effectively use the energy and also creates Bureau Of Energy Efficiency with the primary objective of reducing energy intensity of the Indian economy. On the other hand The Electricity Act, 2003 has tried to ensure coordination in power sector along with the matter of renewable energy and also to promote efficient and benign environmental policies.

Biological Diversity Act, 2002 is enacted to provide for conservation of biological diversity. sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and for matters directly or incidentally connected therewith. This Act contains the provision for conservation, sustainable utilization and equitable sharing of the benefits arising out of utilization of genetic resources and also to give effect to the Rio Convention came into force on the 29th December, 1993 which reaffirms the sovereign rights of the States over their biological resources and which has the objective of conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of utilization of genetic resources;

The Right to Information Act, 2005 has been enacted with the view to promote transparency and accountability in the working of the public authorities and to enable the ordinary citizens to become the part of the decision making process with a view to ensure 'good governance'.

The National Rural Employment Guarantee Act, 2005 (NREGA) provides a legal guarantee of minimum 100 days wage employment in order to eradicate poverty gradually. This Act aims to enhance rural food security and to give effect to fundamental right of life and livelihood of the rural poor. This Act helps to attain the goal of sustainable development because poverty is the biggest cause of environmental pollution.

The National Green Tribunal Act, 2010 lays the framework for the setting of a dedicated environmental adjudicatory forum- the National Green Tribunal for the purpose of effective and expeditious disposal of suits related to environmental protection, forests and natural resources.

Apart from the above, various social welfare legislations have been enacted to make ground for sustainable development. Some notable legislations are Human Rights Act, 1991, Right of

Children to Free and Compulsory Education Act, 2009, Protection of Child Rights Act, 2005, Welfare of Parents and Senior Citizens Act, 2007 etc.

3.3 Governmental policy to achieve Sustainable Development

We have incorporated a comprehensive environmental policy in the year 2006 to control the degradation of environment and to ensure a higher slandered of life to all by eradicating poverty. The main focus of activities of the policy has been on issues such as promotion of clean and low waste technologies, waste water minimization, reuse/recycling, improvement of water quality, environment audit, natural resource accounting, developing of mass based standards, institutional and human resources development etc. The issue of pollution prevention and control is designed to control it by a combination of command and control methods as well as voluntary and regulations, fiscal measures, promotion of awareness and involvement of public. Specific environmental audit manuals have been incorporated to help the industries in preparing environmental statement.

Sustainability concerns have become a vital element in the planning process. "The Ninth Five-Year Plan (1997-2002) explicitly recognized the synergy between environment, health and development and identified as one of its core objectives the need for ensuring environmental sustainability of the development process through social mobilization and participation of people at all levels. In this regard tenth Five Year Plan is noteworthy which gave emphasis on self employment. National action plan on climate change has been initiated to deal with the matter of climate change and twelfth Five Year Plan has a provision regarding inclusive sustainable growth and for protection of climate.

National Ganga River Basin Authority is created for conservation and protection of the sacred river Ganga. Green India Mission is incorporated to conserve and enhance the forest cover area.

4. Role of Indian Judiciary to promote Sustainable Development

The Indian judiciary has engaged itself in creating a new environmental jurisprudence which is full of values for conservation of total environment. Judiciary in India has always tried to make a balance in between the internationally accepted measures and the ancient Indian holistic ideal of

environment. Through evolution of the principle of absolute liability and by incorporation of the 'polluter pays principles', 'public trust doctrine', 'the precautionary principles' the superior judiciary in India has made a fine balance in between the humanistic development and the environment. By using its power of interpretation the judiciary has established a positive linkage in Art.21, 48A and 51A (g) of the constitution.

The positive impetus of judiciary in this regard is to scan 'Right to Environment' not from 'need centric' approach but from 'right centric' approach. The first step towards effectuating the above concept is seen in the case of M.C. Mehta v/s Union of India[9] where the Supreme Court has evolved the doctrine of 'absolute liability'. According to this doctrine, where an enterprise is engaged in a hazardous or inherently dangerous activity and harm caused to any one on account of an accident, the enterprise is strictly and absolutely liable to compensate all those who are affected by the accident, and such liability is not subject to any of the exceptions as laid down in tortuous principles of Strict Liability under the rule laid down in Rylands vs Flecher.

In the case Indian Council for Enviro Legal Action v/s Union of India[10] the Supreme Court evolved the doctrine of 'Polluters Pay Principle' which is one of the basic components of the mechanism related to sustainable development. Polluter pays principle demands that the financial cost of preventing or remedying damage caused by pollution should lie with the industries which caused the pollution.

In M.C. Mehta v/s Kamal Nath[11] the Supreme Court issued a direction to restore the environment and ecology when it comes to the knowledge of the court that the flow of the river was diverted for eco-tourism. In this case the Supreme Court evolves the 'Public Trust Doctrine'. The above doctrine suggests that state is the trustee of all the natural resources, which are by nature meant

9. AIR 1986 SC 1086

10. (1996) 3 SCC 212
11. (1997) I SCC 388

for public use and enjoyment such as sea-shore, running waters, air, forests, ecologically fragile lands etc.

In Vellore Citizens Forum v/s Union of India[12] the Supreme Court evolves the doctrine of 'Precautionary Principle' which has been proved one another mile stone in development of jurisprudence of sustainable development in India. the above doctrine states that lack of scientific certainty cannot be taken as a plea for emitting pollution. The principle of precaution insists us to avoid or choose the least environmentally harmful activity.

In Bombay Dyeing & Mfg. Co. Ltd v/s Bombay Environment Action Group[13] it has been held by Supreme Court that sustainable development demands delicate balance in between environmental values and development needs.

In M.C. Mehta V/s Union of India[14] when the State Government has tried to convert an area earmarked as zonal park in Agra development Master plan into a light industrial area the Supreme Court directed the State Government to rollback from its above policy.

In Karnataka Industrial Area Development Board v/s C Kenchappa[15] the Supreme Court gave the ruling that the lands acquired for development should not be those that proved fatal for the ecology and environment.

From the above, it can be concluded that The Indian judiciary has played a commendable and leading role in the growth of the concept of sustainable development

5. *Sustainable Growth in India*

We have plethora of laws in India along with the effective environmental policies to achieve sustainable pattern of life. India ranks amongst the top ten species rich nations. A recent report by Goldman sachs projected India to be the third largest economy in the world by 2050. Certainly, the above does not appear convincing to all but the recent trnds shows the robust

12. AIR 1996 SC 2715
13. AIR 2006 SC 1489
14. A.I.R. 2002 S.C. 3696
15. AIR 2006 SC 2038

growth rates of India along with the China in GDP in the last few years though India has not been able to achieve its target rate of GDP during the year 2011-12. Our government has also emphasised the need of poverty reduction and incorporated 'inclusive growth' as a major objective in just concluded eleventh Five Year Plan.

But still our legal system has not matured enough to materialize the concept of sustainable development in its letter and spirit. Government of India initiated different programmes and policies but the issues of inequality, poverty, illiteracy are still a matter of major concern and main impediments into the way of implementing sustainable development. The problem of environmental pollution in India has already taken a very grime and grave face and if not controlled we may have to pay a heavy price for it in near future. Ground water in India is under

a serious threat as increasing number of aquifers is reaching unsustainable levels of exploitation. If this trend will continue 60% of India's aquifers will be in critical condition[16]. Not only that, 1/3rd of the land is already drought or flood prone area one and this is happening due to climate change[17].

As per the observation of National Human Right Commission Right to food has yet not been guaranteed and as a matter of fact malnutrition is endemic. 90% of the workforce is in unorganized sector has no access to social security. According to this report National Rural Employment Guarantee Scheme failed to put its desired impact and public spending on health continues to be abysmally zero, 1% of the GDP only. As per the UNDP report[18] India has been placed in the position of 134 among 187 countries and in the medium human development category with only 0.547 HDI values. . India's gender inequality index (GII) value in 2011 is 0.617, giving it the 129th place among 146 countries. For every one lakh live births, 230 women die from pregnancy-related causes, and the adolescent fertility rate is 86.3 births per 1,000 live

16. Deep Wells and Prudence, World Bank 2010, Washington D.C., 20433
17. World Bank Report No.43946, 2008/06/01
18. United Nation Development Report, 2011

births[19]. According to the United nation's Global Hunger Index (GHI) India ranks 67 among 80 countries which are confronting with the acute hunger.

6. Conclusion

To get rid over this situation and to achieve sustainable development in India, it is the need of the hour to formulate a comprehensive plan coupled with the strong political will, transparent and good governance to accelerate the growth of sustainable development. Right to food should be considered as fundamental right, and Food Security Bill should be converted into an Act at earliest. The path of sustainability can only make a better India sans hunger and poverty.

19. Ibid

DISPUTES UNDER LOS CONVENTION

Dr. Arup Kumar Poddar & Sanhita Mukherjee[20]

ABSTRACT: Disputes under the LOS convention are dealt with mainly by four available forums, namely the ITLOS, International Court of Justice, the Arbitral Tribunal and the Special Arbitral Tribunal. Previously, dispute resolution under the law of the sea was not dealt with in details although its importance had been felt in the Conferences of the United Nations on the Law of the Sea. The third Conference gave effect to the dispute resolution mechanism under the law of the sea, besides various other things, which resulted into the formulation of the United Nations Convention on the Law of the Sea, Part XV dealing exclusively with dispute resolution. Among these available forums of dispute resolution, the ITLOS plays a crucial role in settlement of disputes, accompanied by the Seabed Disputes Chamber which is constituted within the ITLOS. This article mainly focuses on the ITLOS and its contribution towards speedy delivery of justice.

INTRODUCTION

Under the Charter of the United Nations all nations are required to settle their disputes of international nature by tranquil means, in accordance with the principles of justice and equity in order to prevent any breach of justice. One of the most triumphant codifications and escalating developments of international law was undertaken by the United Nations in the form of the 1982 United Nations Convention on the Law of the Sea, also known as the LOS Convention. All activities in the seas and oceans must be carried out in accordance international legal order provided by the LOS Convention. All the privileges and duties, which the States have towards the protection and preservation of marine resources, regulation of fishing and underground mining activities, promotion of marine scientific research etc. are clearly explained in the LOS Convention.

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The LOS Convention consists of a separate dispute settlement mechanism in its XVth part which comprises of various compulsory procedures and binding decisions. This part of the LOS Convention may be invoked by an aggrieved party on its own motion.

The dispute settlement mechanism under the LOS Convention has certain unique features. Firstly, it establishes dispute settlement procedures, including compulsory procedures for the correct interpretation of the LOS Convention. These compulsory procedures result into decisions which are binding on the parties. Another striking feature of the Convention is the establishment of a permanent dispute redress body known as the International Tribunal for the Law of the Sea (ITLOS). Finally, the LOS Convention allows the disputing parties to choose from among the various judicial forums available for the settlement of disputes namely the International court of Justice, the International Tribunal for the Law of the Sea, Arbitral Tribunal and Special Arbitral Tribunal.

The first part of this article shall deal with the dispute settlement mechanism prevailing prior to the development of the Law of the Sea Convention. The second part shall elaborate on the dispute settlement mechanism under the LOS convention. The third part shall specifically and exclusively focus on the International Tribunal for the Law of the Sea. The last past shall consist of the concluding words.

DISPUTE SETTLEMENT PRIOR TO THE DEVELOPMENT OF THE LAW OF THE SEA CONVENTION

There is a long the history of adjudication of disputes in the field of the Law of the Sea. The four Conventions on the Law of the Sea did make noteworthy contributions towards the resolution of differences between State parties through various rules and regulations, including, setting out the territorial limits of territorial sea and the continental shelf, followed by various other developments. We shall have a brief discussion in this regard below.

ILC DRAFT ARTICLES ON THE LAW OF THE SEA

The International Law Commission gave some importance to the issue of dispute settlement in its Draft Articles on the Law of the Sea. These consisted of several provisions which subjected Law of the Sea disputes to compulsory settlement by an arbitral commission or by the International Court of Justice. However, it did not provide for compulsory third party settlement of disputes mainly because the need for a new regime for resolution of disputes was not felt at that time. The Commission made Arbitration essential and binding for resolving of disputes, especially in respect of matters relating to fisheries, fisheries conservation etc.[21]

UNCLOS I

The first United Nations Conference on the Law of the Sea was held in the year 1958. The conference was mainly based on the draft articles of the International Law Commission and its commentaries. The four Geneva Conventions adopted at the Conference did not include provisions for compulsory arbitration or judicial settlement of disputes. Dispute settlement mechanism was mainly dependent on the consent of the State parties and the methods of settlement were mainly non compulsory in nature.[22] An Optional Protocol on Compulsory Settlement of Disputes[23] was also adopted but it proved to be a failure as it had not been widely ratified and had never been invoked for settling any dispute.

UNCLOS II

The second conference on the Law of the Sea was mainly faced with disagreements on the issue of the breadth of the territorial sea. Therefore, the system of settling the disputes arising from the Law of the Sea could not be improved.[24]

UNCLOS III

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[21] Donal R. Rothwell and Tim Stephens, The International Law of the Sea, 439-459, Hart Publishing Ltd. (2010).
[22] Ibid.
[23] Optional Protocol of Signature Concerning the Compulsory Settlement of Disputes arising from the Law of the Sea Conventions 1958
[24] See Rothwell and Stephens supra n. 1 at p. 2

From the very beginning of the third Conference on the Law of the Sea the issue of peaceful settlement of disputes was given tremendous importance. It based its work on the compulsory procedures which would provide for uniform interpretation of the LOS Convention. The LOS Convention resulted from the positive steps taken by the States who had participated in the Third United Nations Conference on the Law of the Sea, towards achieving a Convention on the Law of the Sea that is contemporary, advanced and generally acceptable to all the nations. It primarily aimed at contributing to international peace and security by resolving disputes through peaceful means.[25]

Thus it can be said that although in the initial phase of development not much work could be done in the field of peaceful settlement of international disputes arising out of the Law of the Sea yet later on strong and effective provisions were laid down in the Law of the Sea Convention for peaceful and compulsory settlement of disputes.

DISPUTE SETTLEMENT UNDER THE LAW OF THE SEA CONVENTION

Part XV of the LOS Convention deals with settlement of disputes consisting of three sections. Section 1 provides for certain general provisions. Section 2 provides for the compulsory procedures entailing binding decisions. Section 3 provides for the limitations and exceptions towards the applicability of section 2. We shall discuss these provisions in details below.

Article 279 requires the parties to settle their disputes peacefully in accordance with the Charter of the United Nations.[26] Article 280 provides that the parties to the dispute are given a choice of forum and at any time, they may decide to settle their dispute by peaceful means in such chosen forum[27]. Article 281 provides for the procedure of settlement of dispute where no settlement has

[25] Dong Manh Nguyen, Settlement Of Disputes Under The 1982 United Nations Convention On The Law Of The Sea: The Case Of The South China Sea Dispute, 25 U. Queensland L.J. 145 (2006).

[26] See Article279 of the United Nations Convention on the Law of the Sea 1982: *States Parties shall settle any dispute between them concerning the interpretation or application of this Convention by peaceful means in accordance with Article 2, paragraph 3, of the Charter of the United Nations and, to this end, shall seek a solution by the means indicated in Article 33, paragraph 1, of the Charter.*

been reached by the parties.[28] Article 282 provides for the obligation of the State parties acting under various general, regional and bilateral agreements.[29]

A difficulty was faced in the *Southern Bluefin Tuna Case*[30] in the sense that Article 281 of the Convention hinders the achievement of the object and purpose of the Convention, which is the establishment of a comprehensive dispute settlement mechanism. Another case, famously known as the *Mox Plant Case*[31] also faced similar difficulties due to the availability of multiple dispute settlement systems. Both these cases illustrate the fact that multiple dispute settlement proceedings can give rise to significant difficulties each having its own procedure for dispute settlement.

A State party, when signing, ratifying or acceding to the LOS Convention, or at any time thereafter, may declare its choice of one or more of the following forums of dispute settlement available under Part XV of the LOS Convention:

(i) the International Tribunal for the Law of the Sea (ITLOS);

(ii) the International Court of Justice (ICJ);

(iii)an arbitral tribunal; or

(iv)a special arbitral tribunal.[32]

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[27] See Article 280 of the United Nations Convention on the Law of the Sea 1982: *Nothing in this Part impairs the right of any States Parties to agree at any time to settle a dispute between them concerning the interpretation or application of this Convention by any peaceful means of their own choice.*

[28] See Article 281 of the United Nations Convention on the Law of the Sea 1982: *1. If the States Parties which are parties to a dispute concerning the interpretation or application of this Convention have agreed to seek settlement of the dispute by a peaceful means of their own choice, the procedures provided for in this Part apply only where no settlement has been reached by recourse to such means and the agreement between the parties does not exclude any further procedure. 2. If the parties have also agreed on a time-limit, paragraph 1 applies only upon the expiration of that time-limit.*

[29] See Article 282 of the United Nations Convention on the Law of the Sea 1982: *If the States Parties which are parties to a dispute concerning the interpretation or application of this Convention have agreed, through a general, regional or bilateral agreement or otherwise, that such dispute shall, at the request of any party to the dispute, be submitted to a procedure that entails a binding decision, that procedure shall apply in lieu of the procedures provided for in this Part, unless the parties to the dispute otherwise agree.*

[30] New Zealand v. Japan; Australia v. Japan 119 ILR 508 (2000)

[31] Ireland v. United Kingdom 42 ILM 1187 (2003)

[32] See Article 287(1) of the United Nations Convention on the Law of the Sea 1982: *When signing, ratifying or acceding to this Convention or at any time thereafter, a State shall be free to choose, by means of a written declaration, one or more of the following means for the settlement of disputes concerning the interpretation or application of this Convention: (a) the International Tribunal for the Law of the Sea established in accordance with Annex VI; (b) the International Court of Justice; (c) an arbitral tribunal constituted in accordance with Annex VII;*

These forums of dispute settlement are given broad jurisdictions to address disputes concerning the interpretation of the LOS convention as well as the interpretation of various international agreements related to the Convention.[33] Only the disputes concerning the LOS Convention can be settled under Part XV of the Convention.

Under Article 297, certain disputes, such as the rights of navigation, overflying, laying down of submarine cable, the protection and conservation of the marine environment, etc can be excluded from the compulsory procedures. This implies that as far as these disputes are concerned, States which are parties to the LOS Convention cannot be forced to abide by the compulsory procedures.[34] Article 298 enumerates that a State which is a party to the LOS Convention, if,

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(d) a special arbitral tribunal constituted in accordance with Annex VIII for one or more of the categories of disputes specified therein.

[33] See Article 288 of the United Nations Convention on the Law of the Sea 1982: *1. A court or tribunal referred to in article 287 shall have jurisdiction over any dispute concerning the interpretation or application of this Convention which is submitted to it in accordance with this Part. 2. A court or tribunal referred to in article 287 shall also have jurisdiction over any dispute concerning the interpretation or application of an international agreement related to the purposes of this Convention, which is submitted to it in accordance with the agreement. 3. The Seabed Disputes Chamber of the International Tribunal for the Law of the Sea established in accordance with Annex VI, and any other chamber or arbitral tribunal referred to in Part XI, section 5, shall have jurisdiction in any matter which is submitted to it in accordance therewith. 4. In the event of a dispute as to whether a court or tribunal has jurisdiction, the matter shall be settled by decision of that court or tribunal.*

[34] See Article 297 of the United Nations Convention on the Law of the Sea 1982: *1. Disputes concerning the interpretation or application of this Convention with regard to the exercise by a coastal State of its sovereign rights or jurisdiction provided for in this Convention shall be subject to the procedures provided for in section 2 in the following cases: (a) when it is alleged that a coastal State has acted in contravention of the provisions of this Convention in regard to the freedoms and rights of navigation, over flight or the laying of submarine cables and pipelines, or in regard to other internationally lawful uses of the sea specified in article 58; (b) when it is alleged that a State in exercising the aforementioned freedoms, rights or uses has acted in contravention of this Convention or of laws or regulations adopted by the coastal State in conformity with this Convention and other rules of international law not incompatible with this Convention; or (c) when it is alleged that a coastal State has acted in contravention of specified international rules and standards for the protection and preservation of the marine environment which are by this Convention or through a competent international organization or diplomatic conference in accordance with this Convention. 2. (a) Disputes concerning the interpretation or application of the provisions of this Convention with regard to marine scientific research shall be settled in accordance with section 2, except that the coastal State shall not be obliged to accept the submission to such settlement of any dispute arising out of: (i) the exercise by the coastal State of a right or discretion in accordance with article 246; or (ii) a decision by the coastal State to order suspension or cessation of a research project in accordance with article 253. (b) A dispute arising from an allegation by the researching State that with respect to a specific project the coastal State is not exercising its rights under articles 246 and 253 in a manner compatible with this Convention shall be submitted, at the request of either party, to conciliation under Annex V, section 2, provided that the conciliation commission shall not call in question the exercise by the coastal State of its discretion to designate specific areas as referred to in article 246, paragraph 6, or of its discretion to withhold consent in accordance with article 246, paragraph 5. 3. (a) Disputes concerning the interpretation or application of the provisions of this Convention with regard to fisheries shall be settled in accordance with section 2, except that the coastal State shall not be obliged to accept the submission to such settlement of any dispute relating to its sovereign rights with respect to the living resources in*

refuses to accept any of the obligatory measures on specific disputed issues, the opposite party cannot exercise the same measures against them.[35]

the exclusive economic zone or their exercise, including its discretionary powers for determining the allowable catch, its harvesting capacity, the allocation of surpluses to other States and the terms and conditions established in its conservation and management laws and regulations. (b) Where no settlement has been reached by recourse to section 1 of this Part, a dispute shall be submitted to conciliation under Annex V, section 2, at the request of any party to the dispute, when it is alleged that: (i) a coastal State has manifestly failed to comply with its obligations to ensure through proper conservation and management measures that the maintenance of the living resources in the exclusive economic zone is not seriously endangered; (ii) a coastal State has arbitrarily refused to determine, at the request of another State, the allowable catch and its capacity to harvest living resources with respect to stocks which that other State is interested in fishing; or (iii) a coastal State has arbitrarily refused to allocate to any State, under articles 62, 69 and 70 and under the terms and conditions established by the coastal State consistent with this Convention, the whole or part of the surplus it has declared to exist. (c) In no case shall the conciliation commission substitute its discretion for that of the coastal State. (d) The report of the conciliation commission shall be communicated to the appropriate international organizations. (e) In negotiating agreements pursuant to articles 69 and 70, States Parties, unless they otherwise agree, shall include a clause on measures which they shall take in order to minimize the possibility of a disagreement concerning the interpretation or application of the agreement, and on how they should proceed if a disagreement nevertheless arises.

[35] See Article 298 of the United Nations Convention on the Law of the Sea 1982: *1. When signing, ratifying or acceding to this Convention or at any time thereafter, a State may, without prejudice to the obligations arising under section 1, declare in writing that it does not accept any one or more of the procedures provided for in section 2 with respect to one or more of the following categories of disputes: (a) (i) disputes concerning the interpretation or application of articles 15, 74 and 83 relating to sea boundary delimitations, or those involving historic bays or titles, provided that a State having made such a declaration shall, when such a dispute arises subsequent to the entry into force of this Convention and where no agreement within a reasonable period of time is reached in negotiations between the parties, at the request of any party to the dispute, accept submission of the matter to conciliation under Annex V, section 2; and provided further that any dispute that necessarily involves the concurrent consideration of any unsettled dispute concerning sovereignty or other rights over continental or insular land territory shall be excluded from such submission; (ii) after the conciliation commission has presented its report, which shall state the reasons on which it is based, the parties shall negotiate an agreement on the basis of that report; if these negotiations do not result in an agreement, the parties shall, by mutual consent, submit the question to one of the procedures provided for in section 2, unless the parties otherwise agree; (iii) this subparagraph does not apply to any sea boundary dispute finally settled by an arrangement between the parties, or to any such dispute which is to be settled in accordance with a bilateral or multilateral agreement binding upon those parties; (b) disputes concerning military activities, including military activities by government vessels and aircraft engaged in non-commercial service, and disputes concerning law enforcement activities in regard to the exercise of sovereign rights or jurisdiction excluded from the jurisdiction of a court or tribunal under article 297, paragraph 2 or 3; (c) disputes in respect of which the Security Council of the United Nations is exercising the functions assigned to it by the Charter of the United Nations, unless the Security Council decides to remove the matter from its agenda or calls upon the parties to settle it by the means provided for in this Convention. 2. A State Party which has made a declaration under paragraph 1 may at any time withdraw it, or agree to submit a dispute excluded by such declaration to any procedure specified in this Convention. 3. A State Party which has made a declaration under paragraph 1 shall not be entitled to submit any dispute falling within the excepted category of disputes to any procedure in this Convention as against another State Party, without the consent of that party. 4. If one of the States Parties has made a declaration under paragraph 1(a), any other State Party may submit any dispute falling within an excepted category against the declarant party to the procedure specified in such declaration. 5. A new declaration, or the withdrawal of a declaration, does not in any way affect proceedings pending before a court or tribunal in accordance with this article, unless the parties otherwise agree. 6. Declarations and notices of withdrawal of declarations under this article shall be deposited with the Secretary-General of the United Nations, who shall transmit copies thereof to the States Parties.*

In the LOS Convention, the dispute settlement system is a constructive progress in respect of settlement of international disputes relating to the seas and oceans. Resolution of disputes must be done with the help of the international institutions in accordance with the principles of international law and justice by way of obligatory measures. At the same time, right to manage and preserve complete authority over the procedure of settlement of some of the specific disputes is also acknowledged and insured.[36]

INTERNATIONAL TRIBUNAL FOR THE LAW OF THE SEA (ITLOS)

The International Tribunal for the Law of the Sea is a permanent judicial forum specifically meant for the purpose of resolving law of the sea disputes. It has been established in accordance with Annex VI to the LOS Convention, also known as the ITLOS Statute. The seat of ITLOS is situated in the Free and Hanseatic city of Hamburg in the Federal Republic of Germany. It came to existence in the year 1996 and around nineteen cases have already been submitted before it till date.[37]

MEMBERSHIP OF ITLOS

ITLOS is composed of twenty one independent members who are of recognized competence in the field of law of the sea. Not more than one person from a particular State can become the member of ITLOS. The members of the ITLOS are elected from the list of persons nominated by each State party. The election shall take place by way of secret ballot[38]. The members of ITLOS are appointed for a period of nine years and they may be re-elected. The President and Vice President are elected for a period of three years and may be re-elected.[39]

FUNCTIONS OF ITLOS

ITLOS performs a number of functions. It offers a forum of choice for the contracting States which are in disputes with one another regarding the interpretation or application of the

[36] See Nguyen supra n. 5 at p. 3
[37] Yoshifumi Tanaka, The International Law of the Sea, 390-423, Cambridge University Press (2012).
[38] Ibid.
[39] See Article 5 (1) of ITLOS Statute.

provisions of the LOS Convention. These states have the right to determine which of the several alternative procedures they may use for the settlement of disputes that arise between them. The Tribunal also has the competence to deal with disputes between States which are not parties to the Law of the Sea Convention, as long as they are parties to another agreement which provides for disputes to be brought before the Tribunal.[40] The Tribunal also provides for a mandatory procedure for the settlement of certain disputes arising within the framework of the Convention. It also provides for compulsory dispute resolution mechanism especially in respect of those disputes which require quick settlement.[41]

DISPUTES BEFORE THE TRIBUNAL

The ITLOS deals with various kinds of disputes. A very important kind of such dispute is the prompt release of foreign ships and vessels by State authorities for causing the breach of national and international maritime regulations.[42] According to this principle, if a vessel or ship is detained by the State authorities for causing marine or other kind of pollution, then the vessel shall be promptly released in accordance with the order passed by the court or tribunal, only when the flag State provides for a bond or any other kind of security for the purpose of safeguarding the humanitarian and other interests of the flag State. At the same time it shall also have to be ensured that the relevant persons on board the vessel would appear in its national courts.[43]

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[40] Dr Thomas Mensah, The International Tribunal For The Law Of The Sea And The Promotion Of A Legal Order In The Oceans, 1998 Austl. Int'l L.J. 1 (1998).

[41] Ibid.

[42] See Article 292 of the United Nations Convention on the Law of the Sea 1982: *1. Where the authorities of a State Party have detained a vessel flying the flag of another State Party and it is alleged that the detaining State has not complied with the provisions of this Convention for the prompt release of the vessel or its crew upon the posting of a reasonable bond or other financial security, the question of release from detention may be submitted to any court or tribunal agreed upon by the parties or, failing such agreement within 10 days from the time of detention, to a court or tribunal accepted by the detaining State under article 287 or to the International Tribunal for the Law of the Sea, unless the parties otherwise agree. 2. The application for release may be made only by or on behalf of the flag State of the vessel. 3. The court or tribunal shall deal without delay with the application for release and shall deal only with the question of release, without prejudice to the merits of any case before the appropriate domestic forum against the vessel, its owner or its crew. The authorities of the detaining State remain competent to release the vessel or its crew at any time. 4. Upon the posting of the bond or other financial security determined by the court or tribunal, the authorities of the detaining State shall comply promptly with the decision of the court or tribunal concerning the release of the vessel or its crew.*

[43] Hugo Caminos, Law of the Sea, 545-568, Ashgate Publishing Ltd. (2001).

The first case which came before the Tribunal was a request for the quick release of a ship and its members on board, which had been arrested in a foreign port. This case was a success for the Tribunal because its order for the release of the ship and crew was complied with. In this case the ITLOS had observed that "the prompt release procedure seeks to reconcile the interest of the flag State to have its vessel and its crew released promptly with the interest of the detaining State to secure appearance in its court of the Master and the payment of penalties".[44]

The ITLOS has a special authority which comprises of requests for provisional measures, pending the final decision on the merits of a dispute. According to this authority a party to a dispute may claim that certain rights which are the subject of the dispute require to be preserved against possible irreparable harm pending the final decision in the case. In the *M/V Saiga Case*, the Tribunal had received a request for prescribing certain provisional measures, pending the final decision on the merits of the case. In accordance with the rules, this request was dealt with expeditiously by the Tribunal at the international level.[45]

The jurisdiction of the Tribunal is not restricted to disputes concerning the interpretation of the Convention. The Statute of ITLOS states that "the jurisdiction of the Tribunal comprises disputes and all applications submitted to it in accordance with Convention and all matters specifically provided for in any other agreement which confers jurisdiction on the Tribunal".[46] Therefore the ITLOS can adjudicate disputes in maritime area which is outside the ambit of the LOS Convention.[47]

SEABED DISPUTES CHAMBER

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[44] The M/V Saiga Case, Case no. 1, ILM (1998).
[45] Ibid.
[46] See Article 21 of the Statute of ITLOS. See also Article 288 of the United Nations Convention on the Law of the Sea 1982: 1. *A court or tribunal referred to in article 287 shall have jurisdiction over any dispute concerning the interpretation or application of this Convention which is submitted to it in accordance with this Part. 2. A court or tribunal referred to in article 287 shall also have jurisdiction over any dispute concerning the interpretation or application of an international agreement related to the purposes of this Convention, which is submitted to it in accordance with the agreement. 3. The Seabed Disputes Chamber of the International Tribunal for the Law of the Sea established in accordance with Annex VI, and any other chamber or arbitral tribunal referred to in Part XI, section 5, shall have jurisdiction in any matter which is submitted to it in accordance therewith. 4. In the event of a dispute as to whether a court or tribunal has jurisdiction, the matter shall be settled by decision of that court or tribunal.*
[47] See Caminos, supra n. 23 at p. 7

The ITLOS provides for a mandatory procedure for the settlement of certain disputes arising within the framework of the LOS Convention. These mainly include disputes on the interpretation and application of the provisions of the LOS Convention concerning deep sea mining, for the purpose of exploration and exploitation of the resources of the sea-bed and ocean floor beyond the limits of national legislation. The Seabed Disputes Chamber of the ITLOS exercises complete jurisdiction over these issues, unless the parties to the dispute concur to choose some other forum for the settlement of their dispute.[48]

The jurisdiction of the Chamber extends to States, international organisations, juridical persons such as corporations, as well as individual persons, if they are engaged in activities in the international seabed area within the scope of Part XI of the Convention.[49]

The Seabed Disputes Chamber has the competence to give advisory opinions to the Assembly and Council of the International Seabed Authority on legal questions arising within the scope of their activities. The International Seabed Authority is the international body which deals with the regulation of mining activities in the international sea-bed area on behalf of the entire international community. Advisory opinions are given by the Seabed Disputes Chamber at the request of either the Assembly or the Council of the Authority and this jurisdiction is an exclusive jurisdiction exercised by the Chamber.[50]

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[48] See Article 186 of the United Nations Convention on the Law of the Sea 1982: *The establishment of the Seabed Disputes Chamber and the manner in which it shall exercise its jurisdiction shall be governed by the provisions of this section, of Part XV and of Annex VI.*

[49] See Article 187 of the United Nations Convention on the Law of the Sea 1982: *The Seabed Disputes Chamber shall have jurisdiction under this Part and the Annexes relating thereto in disputes with respect to activities in the Area falling within the following categories: (a) disputes between States Parties concerning the interpretation or application of this Part and the Annexes relating thereto; (b) disputes between a State Party and the Authority concerning: (i) acts or omissions of the Authority or of a State Party alleged to be in violation of this Part or the Annexes relating thereto or of rules, regulations and procedures of the Authority adopted in accordance therewith; or (ii) acts of the Authority alleged to be in excess of jurisdiction or a misuse of power; (c) disputes between parties to a contract, being States Parties, the Authority or the Enterprise, state enterprises and natural or juridical persons referred to in article 153, paragraph 2(b), concerning: (i) the interpretation or application of a relevant contract or a plan of work; or (ii) acts or omissions of a party to the contract relating to activities in the Area and directed to the other party or directly affecting its legitimate interests; (d) disputes between the Authority and a prospective contractor who has been sponsored by a State as provided in article 153, paragraph 2(b), and has duly fulfilled the conditions referred to in Annex III, article 4, paragraph 6, and article 13, paragraph 2, concerning the refusal of a contract or a legal issue arising in the negotiation of the contract; (e) disputes between the Authority and a State Party, a state enterprise or a natural or juridical person sponsored by a State Party as provided for in article 153, paragraph 2(b), where it is alleged that the Authority has incurred liability as provided in Annex III, article 22; (f) any other disputes for which the jurisdiction of the Chamber is specifically provided in this Convention.*

Thus the Seabed Disputes Chamber recognizes the importance of non State entities and also values their legal standing in the field of management of resources of the oceans. By virtue of this recognition, on one hand, these non State entities can seek redress against the activities of the International Seabed Authority which was not available to them before, and on the other hand it brings them under certain control and restraint so that their activities in the oceans do not have negative repercussions on the interests of the States.[51]

CONCLUSION

The dispute settlement procedure under the LOS Convention consists of both voluntary as well as mandatory procedures. Multiple forums for dispute settlement are available which at times generate confusions as each forum has its individual way of settlement and multiple choices leads to multiplicity of proceedings. While certain disputes are exempted from compulsory procedures, there are various disputes which require mandatory settlement. The formation of the International Tribunal for the Law of the Sea is a drastic step towards expeditious delivery of justice. It has been found that till date ITLOS has dealt with fourteen distinct cases and delivered about twelve judgements. Majority of disputes in which ITLOS's jurisdiction has been invoked are either the prayer for provisional measures or the prompt release of ships and its crews. In addition to this, the Seabed Disputes Chamber, which is constituted within the ITLOS, works efficiently in matters of exploration and exploitation of the resources of the deep seabed, subsoil and ocean floor. The ITLOS has worked in consistence with the jurisprudence of the International Court of Justice as well as the principles of international law. However, it is too early to speak about the future prospects of the ITLOS, yet till now it seems to be an appropriate forum for quick settlement of disputes arising from the law of the sea. It is expected that in near future the ITLOS shall contribute extensively towards the speedy disposal of disputes and impart justice to the aggrieved parties.

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[50] See Article 191 of the United Nations Convention on the Law of the Sea 1982: *The Seabed Disputes Chamber shall give advisory opinions at the request of the Assembly or the Council on legal questions arising within the scope of their activities. Such opinions shall be given as a matter of urgency.*

[51] See P. Chandrasekhara Rao and Ph. Gautier, The Rules of the International Tribunal for the Law of the Sea: A Commentary, 55-396, Maritime Nijhoff Publishers (2006).

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