Green Gray

ENVIS NEWSLETTER

CENTRE FOR ENVIRONMENTAL STUDIES
N-3/56, IRC VILLAGE, BHUBANESWAR-751015
(Forest & Environment Department, Government of Orissa)

May - July 06 Vol-5 No-1

Hon'ble Chief Minister, Orissa releasing the ENVIS newsletter on 5th June 2006
Also present are (R-L), K. Jude Sekar, Director, Environment-cum-Spl. Secy. to Govt. & Director, CES (transferred) and S.P. Nanda, Principal Secretary, Forest & Environment Department.

Editorial

The ENVIS Centre at Centre For Environmental Studies was established on October 15, 2004 under the Environmental Information System (ENVIS) of the Ministry of Environment and Forests, Government of India. The Centre was assigned the responsibility for being the Nodal Point for information on State of Environment and related issues.

Over the last two years, the Centre has been recognized by users (NGO, administrators, specialized agencies, researchers, school and college students, media professionals, and others) .The ENVIS Centre regularly responds several queries and requests for information on various subjects and topics concerning environment in Orissa. In addition the Centre also responded to numerous queries on telephone, email, as well as personal visits by users.

The Centre has responded by updating or compiling information in new areas. As a part of this initiatives a website www.cesorissa.org has been created by the center which disseminates information on environmental NGOs in Orissa, environment related matters which consists a searchable database on environmental parameters like Water, Air, Soil, Agriculture, Land use, Waste, etc., apart from publishing this newsletter, and answering queries from interested users. The data and information can be accessed through the website which is updated periodically. Electronic version of newsletters are also posted in the website. The Centre is facing challenges of data collection in the relevant field as some data are unreported and scattered and some are expensive. This newsletter is a part of a series on state of Environment related issues in Orissa. This particular issue highlights on chromite mining and its pollution status in Orissa.

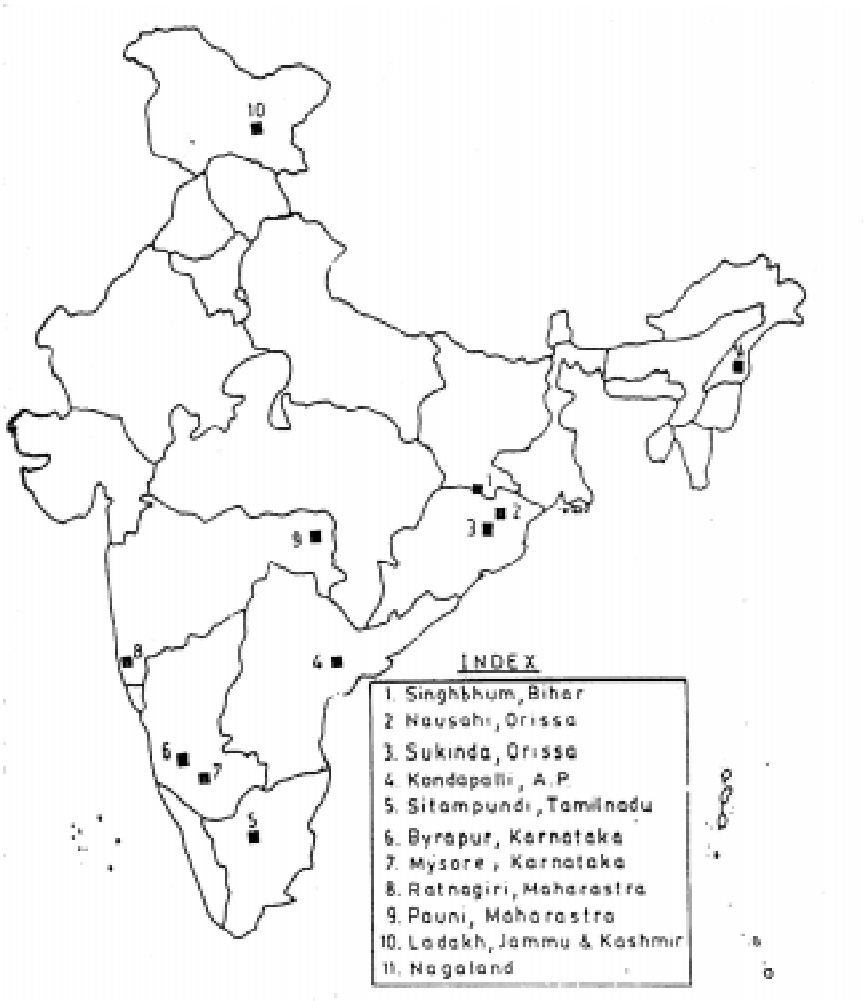
Sri B.K. Patnaik, IFS
Director, Centre For Environmental Studies

State of Environment: Chromite Mining & Related issues

Chromite deposits are distributed on broad geological time scale, variety of large types and different geological settings. These are confined mainly to Precambrian – Archean and mesozoic-tertiary periods. India shared some 17% of the global production of Chromite ore in the year 2004. (United States Mineral Resource Programme)

The state produced 3123386 MT of Chromite ore in the year 2004-05 of which 3035201 tones were explored from Jajpur district alone (with such a quantum is explored from one place). Pollution due to hexavalent chromium, overburden dump, mine water discharge needs attention, in this area.

Production of Chromite in Orissa in MT				Table-I	
Districts	**2000-01**	**2001-02**	**2002-03**	**2003-04**	**2004-05**
Dhenkanal	43288	19329	17241	12710	12261
Jajpur	1737442	1678435	2976081	2812446	3035201
Keonjhar	61705	67996	70972	71262	75924
Orissa	**1842435**	**1765760**	**3064294**	**2896418**	**3123386**



Map showing prominent Chromite deposits of India
Occurrences 1 to 9 – Shield area, Archean precambrian
10, 11 – Tertiary.

Orissa holds the prime place in chromite reserves and production accounting for more than 95% of the country's chromite wealth. The State has 25199 thousand tones of proved, 29926 thousand tones of probable, 28477 thousand tones of possible chromite ore reserves (Table-II). Some 16 working chromite mines are operating in Orissa located over 7481.88 hectare of lease area and 5263.662 hectare of forest area (Table-III).

Chromite reserves in India in' 000 tonnes **Table-II**

State	Proved	Probable	Possible	Total
India	25734	30775	29720	86229
Andhra Pradesh	-	13	103	116
Bihar	13	21	300	334
Karnataka	502	756	194	1452
Tamil Nadu	6	-	234	240
Orissa	25199	29926	28477	83602

Source- IBM Publications

Table-III

District	Name of the lessees	Location of the lease	Area (ha.)	Forest area (ha.)
Dhenkanal	M/s FACOR Ltd.	Kathpal	113.312	113.312
Jajpur	M/s B.C. Mohanty & Sons (P) Ltd.	Kamarda	107.24	101.85
Jajpur	M/s FACOR Ltd.	Ostapal	72.843	68.424
Jajpur	M/s IDC of Orissa Ltd.	Tailangi	65.683	20.882
Jajpur	M/s IMFA Ltd.	Chingudipal	26.62	26.62
Jajpur	M/s IMFA Ltd.	Kaliapani	116.76	0
Jajpur	M/s Ispat Alloys Ltd.	Kaliapani	64.463	0
Jajpur	M/s Jindal Strips Ltd.	Kaliapani	89	24.241
Jajpur	M/s M.L. Mines (P) Ltd.	Saruabil	246.858	224.633
Jajpur	M/s O.M.C. Ltd.	South Kaliapani	552.457	416.499
Jajpur	M/s O.M.C. Ltd.	Kaliapani	971.245	749.995
Jajpur	M/s O.M.C. Ltd.	Sukrangi	382.709	177.76
Jajpur	M/s TISCO Ltd.	Sukinda	406	73.698
Keonjhar	M/s IMFA Ltd.	Nuasahi (Old)	40.468	0.339
Keonjhar	M/s O.M.C. Ltd.	Bangur	145.85	5.91
Keonjhar	M/s FACOR Ltd.	Boula	187.03	187.03

Source- Directorate of Mines

Chromite deposits are mostly located in Sukinda valley of Jajpur district and Boula-Nuasahi belt of Bhadrak district. These are mainly associated with laterite, altered, ultramafic rock, nickeliferrous limonite and talc serpentine schist. The processed ore through the region is imported to meet the need of Ferro alloys industries in the country. Chromite export from Orissa has been increased from 3.46 lakh tones in 1994-95 to 11.68 lakh tones in 2003-04. The total export from Paradeep Port Trust was 7 lakh metric tones in 2003-04 (Table-IV).

Manual Mining of Chrome Ore

Table-IV

Export through Paradeep port (in lakh MT)

Year	Chrome Ore	Charge Chrome/ Chrome Ore
1997-1998	3.02	1.00
1998-1999	1.56	0.87
1999-2000	3.78	0.30
2000-2001	4.22	0.34
2001-2002	3.38	0.17
2002-2003	4.67	7.72
2003-2004	4.40	7.28

Source- Economic Survey

Chrome Benefication:

Low grade Chromite are fed to Chrome Ore Beneficiation (COB) plants where the ore are concentrated through washing and sorting. Majority of the COB plants in Orissa are located in Jajpur district (Table-V). Besides these, there are more than 10 small beneficiation plants, which obtain medium grade ore from TISCO, OMC and IMFA groups and sell concentrates to the chemical manufactures and for exports.

Table-V

Major Chrome Ore Beneficiation Plants in Orissa

Agency	Location	Rated feed Capacity	Projected Output
FACOR	Ostapal	80000 tpa	30000 tpa
TISCO	Bhimatnagar	300000 tpa	105000 tpa
OMC	Kaliapani	165000 tpa	64000 tpa

Source- IPICOL

Chromite is consumed by Ferro chrome, charge chrome, refractory, chemicals and other industries. Charge chrome and ferro chrome accounts for more than 80% of the chromite demand. Orissa has a share of 86% of the chromite ore in Ferro Chrome and Charge Chrome industries, 8% in refractory, 6% in chemicals and a lesser percent in ceramics, cement, etc.

Because of availability of iron ore, chrome ore mining has a better potential in developing ferro alloys manufacturing units in Orissa. Ferro alloys plants has witnessed a sound growth over last few years (Table-VI).

Chromium as a pollutant

For quite sometime chromite matrix was considered to be most stable and chromium pollution due to chromite mining or handling was thought to be impossible. Recent studies reveal that Chromium is lodged in Chromite gets oxidised by various physico-chemical and biological processes.

Mining water being pumped out

Table-VI

Ferro Alloys Plants in Orissa

Industry	Products	Production Capacity (TPA) HCFC basis
FACOR, Randia, Bhadrak	Charge Chrome / High Carbon Ferro Chrome	50,000
Ferro Alloys Plant, TISCO, Bamnipal	Charge Chrome / Ferro Chrome	50,000
ICCL, Choudwar	Charge Chrome / Fein rro Chrome	62,500
IMFA, Rayagada	Ferro Silicon / Charge Chrome / High Carbon Ferro Chrome	1,00,000
Balasore Alloys	Ferro Manganese, Ferro Silicon, Ferro Chrome and Silico Manganese	95,000
Nav Bharat Ferro Chrome	High Carbon Ferro Chrome	50,000
IDCOL Ferro Chrome and Alloys Ltd.	High Carbon Ferro Chrome	21,606

Source- OSPCB

Chromium in trivalent oxidation state has found in chromite and other natural minerals as essential nutrient. Its principal function is to maintain normal glucose metabolism. Chromium deficiency can lead to problems in insulin circulation as well as possibility of cardiovascular disease. Hexavalent form of chromium which is used widely in chemical compounds has been implicated in skin cancer and long cancers. It is cytotoxic, mutagenic and carcinogenic.

The high energy required to oxidize the trivalent form of chromium is not available to biological system and so all the hexavalent chromium found in nature is derived form human activities.

Two lakh tones of chromium are released to the environment by weathering due to surface exposure and rainfall in India (Bertlin and Goldberg). In Sukinda Chromite area, Oxides of Nitrogen (NOx), Suspended Particulate Matter (SPM) and Respirable Particulate Matter (RPM) in the mines working area lie in the range of 60- 59.7, 31.2 – 320.4 and 19.3 – 258.1 microgram per cubic meter respectively whereas in residential area these are in the range of 6.8 – 49, 45 – 200.1 and 23.4 – 98.1 microgram per cubic meter. SO_2 level is found to be negligible throughout the area.

According to a postulate by Honda (1982) Chromium after all the natural barriers of precipitation and absorption may come down to a non-harmful level, but places where chromium is used for leather tanning, electroplating has much more chromium in environment particularly in surface and ground water. Natural cleaning process like rain water dilution, large organic sewage load and bed sedimentation have by and large kept most river water free from chromium.

While the oceanic water containing nanomole of concentration, some of the estuaries and coastal water and sediments show a slight build up of chromium which are carried by the river.

Apart from mine water drainage the over burden dump has a huge potential of polluting the surface water. In Sukinda valley of Orissa, mines dumps are located through out this area and even near banks of Brahmani River. Over 30 million tones of over burden (rock waste left behind after the ore is removed) has been discarded so far.

Plantation on Overburden Dumps to reduce soil erosion

Mine Water flowing through an abandoned mine being used for bathing

Natioal Ambient Air Quality Standards

Location/ Zone	SO_2	NOx	SPM	RPM
Industrial	120	120	500	150
Residential	80	80	200	100
Sensitive	30	30	100	75

Source-OSPCB

To assess the pollution potential of chromite mines in the Sukinda Valley in Orissa and Coal mines in Talcher of Orissa, detailed survey and environmental monitoring were conducted by the Central Pollution Control Board Eastern Zone office. It was observed at the chromite mines that enormous volume of water containing chromium in hexavalent form was being discharged into adjacent water bodies. The overburden was being dumped near the queries as a result soluble metals may percolate to the ground water. The treatment facilities are limited.

Source- www. envfor.nic.in

One tone of chromite mining generates about ten tones of over burden on a average which are diverse in chemical and mineralogical characters. In most areas of Sukinda valley, the over burden are predominantly in nickeli ferrous laterite containing 0.7% nickel. The standard dump will have average exposed surface of 47200 Sq. Meter can take the rain water penetrability of 0.25 meter, about 0.2 million cube meter of over burden are prone to rain water leaching. Taking the average chromium oxide contained to this over burden to be 6%, about 23745 tones of chromium oxides are exposed to light, air and rainwater from all the OB dumps in Sukinda Valley. Thus about 7.6 MT of OB stored per annum has a potential of releasing 11.73 tone of hexavalent Chromium per year into the environment.

Source- Abatement of pollution due to chromite mine in Orissa, RRL, BBSR

The dangerous contamination of this geographical and industrial features, the area prone to flooding has resulted in the significant contamination of water waste by hexavalent chromium. According to a Orissa State Pollution Control Borad Analysis report of 2004-05, the hexavalent chromium concentration in overburden is varied in the range of 12 – 311 mg/Kg.

About 7000 people are directly employed by chromite mines while that depends on Brahmani river for water & sustenance is around 2.6 million. 70 % of surface water sample & 60% discharge water sample contained hexavalent chromium over 0.1 milligram per liter (bulletin of environment contamination). The abandoned mines are usually used for bathing purpose by those who are unaware of the potential threat of hexavalent chromium contamination.

For proper management of over burden dumps, plantation of dumps and provision of garland drains are provided in some mines. This include systematic sorting and stacking of over burden and plantation on over burden dumps to reduce erosion. State Pollution Control Board has taken initiatives in some mines in Orissa to make mandatory for construction of Effluent Treatment Plant (ETP) to reduce the pollution of hexavalent chromium at source. The conventional method of reducing hexavalent Chromium to trivalent Chromium by ferrous sulphate in a controlled pH are usually adopted by mine owners.

The state being a repository of chromite ore, mining of this would continue further. Reduction of hexavalent chromium load is also a challenge for the future. Better institution to curb the pollution load and systematic management of overburden and restoration of deforested area are necessary for a production-less pollution of chromite mining in Orissa.

KNOW THE RULES

Water (Prevention and Control of Pollution) Act – 1974

This is a comprehensive piece of legislation especially enacted for the purpose of prevention and control of pollution of water. The Act was amended in the year 1988. This Act enables the establishment of a central and State Pollution Control Boards to carry out various functions under the Act to promote the cleanliness of streams and wells and to prevent and control pollution of water. The Act prohibits disposal of polluting matter in streams, wells and sewers or on land in excess of the standards established by the state boards. The Act makes it mandatory for a person to obtain consent from the state board before taking steps to establish any industry, operation or process and also for installing a treatment plant or a disposal system for discharging effluents. Section 33A of this Act empowers state boards to issue directions to any person, officer or authority, including an order to close, prohibit or regulate any industry, operation or process and to stop or regulate the supply of water, electricity or any other service.

Air (Prevention and Control of Pollution) Act, 1981

This Act is also known as Air Act. It is similar to Water Act. This Act was amended in 1987. The Act gives discretion to each state govt. to declare a particular area as "Air Pollution Control Area". Every industrial operator within an air pollution control area has a mandatory duty to obtain consent from the state board. The Act also covers noise pollution.

Environment Protection Act (EPA) – 1986

After the Bhopal disaster which took place in 1984, Govt. of India enacted this Act under Article 253 of the Indian Constitution. The main objective of the Act is to implement the decisions of the United Nations Conference on the Human Environment of 1972, which relate to the protection and improvement of the human environment and prevention of hazards to human beings, other living creatures, plants and property. The Environment Protection Act gives wide powers to the Central Government to take all such measures which are necessary for protecting and improving the quality of environment and preventing, controlling and removing environmental pollution. The Government can fix standards for the quality of environment as well as standards for controlling emissions and effluent discharges, to regulate industrial locations, to lay down procedures for managing hazardous substances, to establish safeguards for preventing accidents and to collect and disseminate information related to environment pollution. The Act also gives power to the Government to make orders to prohibit any activity, close an industry or stop or regulate the supply of electricity or water or any other service to prevent and control environmental harm. As per the Act, a duty is imposed on persons carrying on an industry or an operation to prevent emission or discharge of environmental pollutants in excess of fixed standards. A non-delegable duty is imposed on persons handling hazardous substances to comply with all the procedural safeguards that may be prescribed by the Government from time to time. The provision of citizens suit of the Environment Protection Act gives the people signified powers enables any person to file a complaint with a court against a polluter.

National Environment Appellate Authority Act - 1997

The Act was passed by Govt. of India. It provides for the establishment of a National Environment Appellate Authority to hear appeals with respect to restriction of areas in which industry or operation shall be carried out subject to certain safeguards under the Environment Protection Act, 1986- while deciding the cases of appeal under the Act, the Appellate Authority is bound by the principles of natural justice and the provisions of the Act in question.

What some dailies report: -

1. **e-waste menace**

The total waste generated by obsolete or broken down electronic and electrical equipment in India is estimated at 1,46,180 tones per year apart from imports which account to several hundred tones. It is called e-waste or waste from electronic and electrical equipment (WEEE). Toxic substances from e-waste such as residues of lead, cadmium, mercury, PVC, plastic, lead and cadmium batteries dumped on landfills contaminate land, water and air, posing serious health hazards.

The Karnataka State Pollution Control Board has given authorization for two commercial enterprises to handle e-waste in Bangalore. They are e-parisaraa and Ash-recyclers.

Source- The New Indian Express, May-8, 2006

2. **Micro watershed development project in Orissa**

A Micro watershed development project has quietly transferred lives in Kashipur by making the soil fertile and checking the rampart migration of farmers for work and food. With this watershed development, there has been a 50% increase in crop yields and income. This has been possible with the support of German Agro Action 1994-99 backed by Agragamee, an NGO working in livelihood issues among tribal of Kashipur.

Source- Indo-Asian News Service, May-8, 2006

3. **Global warming threatens Florida**

A study of Nine Florida coastal areas conducted by the Florida Wildlife and National Wildlife federations suggests many bays and estuaries will be inundated by 2100 due to sea-level rise if global warming continues. The survey also projects the alternation the extent and composition of important habitats and fishing. The coastal includes Pensacola Bay, Apala Chicola Bay, Tampa Bay, Charlotte Harbor, Ten thousand Islands, Florida Bay, Biscayne Bay, St. Lucie Estuary and the Indian River Lagoon.

Source- United Press International, June-6, 2006.

4. Pollution can change sex ratio among fish

In a three and a half year study conducted in City University of Hong Kong found that a lack of oxygen in highly polluted waters could sharply alter the sex ratio among fish, resulting in far more males than females, which could result in the extinction of a species. Hypoxia or oxygen depletion, occurs when there are less than two parts of oxygen for every million parts of water. It occurs naturally in places where salt and fresh waters meet through it is now also caused by pollution in many parts of the world.

Source-Reuters website

5. Bio-fuels poised to displace oil

Bio-fuels such as ethanol and bio diesel can significantly reduce global dependence on oil. The report has been released by the world watch. Institute in collaboration with the German Agencies for Technical Cooperation (GTZ) and Renewable Resources (FNR), Bio-fuel production has doubled since 2001 and is poised for even stronger growth as the Industry responds to higher fuel prices and supportive government policies. Brazil is the world's bio-fuel leader with half of its sugar cane crop providing more than 40% of its non-diesel transport fuel. In United States, 15 percent of the corn crop provides about 2 percent of the non-diesel transport fuel and Ethanol production is growing even more rapidly. It has been projected that bio-fuels could provide 37 percent of U.S. transport fuel within the next 25 years.

Source- World Watch Institute, June-7, 2006

6. World's largest crocodile in Bhitarkanika

A 23 foot long crocodile from the estuaries of Bhitarkanika Wildlife Sanctuary has been found. It is also found in the pages of 2006 edition of Guinness World Records. As per the latest enumeration carried out by the Wildlife Wing of the Forest Department, there are 1462 crocodiles in the rivers and creeks of Bhitarkanika. There are four numbers of massive crocodiles which measure between 19 and 23 feet.

Source- The New Indian Express, June-13, 2006.

7. Waste Summit

Waste Summit 2006 will be held from July 25 to 27 in Johannesburg, South Africa. It will bring together "Waste Management Professionals from the government and private sector to implement cutting edge strategies that will protect the future of our environment".

Source- The New Indian Express, June-30, 2006.

8. Extraction of Nickel from mines waste

India is the second country in the world to indigenously develop a technology for nickel from wastes generated in chromite mines.

Source- The Hindu Business Line, May-24, 2001

9. Eco-friendly pump brings fortunes for farmers

A new pump named surface treadle pump (STP) has been developed by International Development Enterprises India (IDEI). It uses human energy. The amount of water lifted would be double that of the traditional water lifting device "tenda". By foot water out put capacity is 3000-4000 liters per hour depending on the user's body weight. It can be used by a seven year old child or 70 year old woman. Till date 15000 STP units have been sold in the state.

Source- The New Indian Express, July 4, 2006.

10. ISO for Nuasahi chromite mines

The IMFA Group's Nuasahi chromite mines, located in Keonjhar district of Orissa, has been awarded the ISO 14001 certification by the Mumbai-based IRQS certification agency.

According to a company press release, the Nuasahi chromite mines of the ferro alloys manufacturing IMFA Group has become the first underground metalliferous mines in the country to bag the ISO 14001 certification, thereby, signifying the existence of a proper environment management system.

The Group's ferro alloys operations are already ISO 9000 certified. Its 108 MW captive power plant located at Choudwar near Cuttack has also been awarded the ISO 14001 certification, according to the release.

Source- The Hindu, July 21, 2004

11. Chromium: Are Chinese Off-Takes About to Take Off

In 2005, the U.S. alone consumed 11% of the world's new chromite ore production. No chromite ore was mined in the U.S. 95% of the world's chromium resources are in South Africa and in Kazakhstan.

Today the Chinese import principally from South Africa and covert the ore to ferrochrome in which state it used as an additive by steel mills producing stainless steel and superalloys. China has political issues with Kazakhstan over the treatment of ethnic Chinese Moslem minorities in territory bordering Kazakhstan that have until now interfered with the chromite trade.

Source- www.rusmet.net

12. Chromite ore ships out of Port Hedland

The first shipment of processed chromite ore has left Port Hedland in Western Australia's Pilbara, bound for Shanghai. The ore is mainly used in stainless steel and it's from Australia's only commercial chromite operation called Coobina Chromite. Previously only raw ore had been sent, but today's shipment of processed chromite is the first delivery of a 250,000 tone a year contract with China, the world's largest importer.

Feedback

We would appreciate if you send us comments and suggestions.

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Sri G.K.Pujari, Programme Officer (CES) and P. M. Dash, Programme Officer (ENVIS) have prepared this newsletter

If you would like to be included in the mailing list,
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This newsletter is supported by ENVIS, Ministry of Environment & Forests, Govt. of India.