

STATUS OF FLY ASH DISPOSAL SITES IN EASTERN INDIA

Google Earth



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SUMMARY

Fly ash is a waste generated in the process of coal combustion in Coal Fired Thermal Power Plant. This fly ash is generally laden with several heavy metals which are also toxic in nature. Unscientific fly ash disposal causes contamination of water bodies and agriculture, making it a risk to human health. This issue is problematic because exposure to fly ash is known to cause heart damage, lung disease, respiratory distress, among many other illnesses.

Given the severe risk fly ash poses, our study has mapped and analyzed its disposal across eastern India. The analysis was done using Google Earth and QGIS. We found fly ash dumping sites across the region, near river banks, agricultural fields, and forest areas. It is evident that such dumping has continued in an unplanned and uncontrolled manner. The lack of proper regulations or guidelines on fly ash disposal has led to unabated dumping, posing a grave threat to the environment. Thus, there is an urgent need to issue siting guidelines for fly ash disposal in India.

KEY FINDINGS

- ▶ Nearly 4,518 ha of land in eastern India is under fly ash disposal sites, which is more than the entire area of New Delhi..
- ▶ The agricultural lands surround almost 43% of fly ash disposal sites in eastern India.
- ▶ In eastern India, about 12% of fly ash dumping is near river/water bodies. Approximately 20% of fly ash dumping sites are within 100 m distance from a water body.
- ▶ Out of 74 ash disposal sites, 11 are in high damage risk earthquake zone, and 28 are in high damage risk wind and cyclone zone.

INTRODUCTION

Fly ash is waste generated by the coal-fired thermal power plant due to the combustion of coal/lignite. The particle size of fly ash ranges from 0.01 to 100 μm . The mineralogical, physical, and chemical properties of fly ash depend on the type of coal, combustion conditions, emission control devices, and handling methods used^[1]. It is grey to black in colour, abrasive, alkaline, and refractory in nature. Chemically it is a mixture of oxides, hydroxides, carbonates, silicates, and sulphates of calcium, iron, aluminium and contains heavy metals including arsenic, lead, mercury, cadmium, chromium, and selenium^[2]. The heavy metals may leach out from fly ash disposal sites or dumping sites to the nearby water bodies, contaminating the water^[3]. In India, several cases of spillage of fly ash from the ash disposal sites have been reported, which have contaminated the water reservoirs^[4]. Once heavy metals from fly ash are released into the water bodies or in the environment, there is a possibility of bioaccumulation in the higher trophic levels of the food chain.

Fly ash is a toxicant and can cause cancer and nervous system impacts such as cognitive deficits, developmental delays, and behavioural problems if eaten, drunk, or inhaled^[5]. They can also cause heart damage, lung disease, respiratory distress (bronchitis, silicosis, and asthma), kidney disease, reproductive problems, gastrointestinal illness, congenital disabilities, and impaired bone growth in children. Living next to unlined wet ash disposal sites (surface impoundment) can increase the risk of as much as a 1 in 50 chance of getting cancer from drinking arsenic-contaminated water^[6].

The Indian coal is of low grade with high ash content (30-45%). Hence, a large quantity of ash is generated at coal/lignite-based thermal power stations^[7]. Due to the high ash content in India's coal, approximately one acre (or 0.405 ha) per megawatt (MW) of installed thermal capacity is required for ash disposal^[8]. Therefore, the requirement of more land for the disposal of generated fly ash is inevitable if not utilized. The Ministry of Environment, Forest, and Climate Change (MoEFCC) has issued various notifications on fly ash utilization. The first notification was issued on September 14, 1999, subsequently amended in 2003, 2009 and 2016, vide notifications dated August 27, 2003, November 3, 2009 and January 25, 2016. These notifications prescribe the targets of fly ash utilization in a phased manner for all coal/lignite based thermal power stations in the country so as to achieve 100% utilization of fly ash by the end of fourth year of the operation of any coal-fired thermal power plant^[9]. In spite of such fly ash utilization notification, in the year 2011, the fly ash production was about 200 million tons and by 2032 it is expected to touch about 900 million tons^[10]. If this trend continues, by the year 2019-2020, 1000 km² of land, equal to the size of the Hong Kong, or 1 m² per person, should be required for ash disposal only^[11]. Exposed fly ash spread over a large area has severe environmental threats in terms of air and water pollution, and the health of citizens.

Information regarding location and extent of fly ash disposal site in India is not readily available. Therefore, objective of the present study is to identify the locations of various fly ash disposal sites and calculate the area of each site in eastern India, to push for formulation of siting guidelines.

01. <http://wgbis.ces.iisc.ernet.in/energy/water/paper/TR126/annexure1.PDF>

02. <https://www.psr.org/wp-content/uploads/2018/05/coal-ash-hazardous-to-human-health.pdf>

03. http://www.ijaerd.com/papers/finished_papers/THE_CURRENT_SCENARIO_OF_THERMAL_POWER_PLANTS_AND_FLY_ASH-PRODUCTION_AND_UTILIZATION_WITH_A_FOCUS_IN_INDIA-IJAERDV05I0442388.pdf

04. <http://sanitation.indiawaterportal.org/english/node/2709>

05. <https://www.psr.org/wp-content/uploads/2018/05/coal-ash-hazardous-to-human-health.pdf>

06. <https://www.psr.org/wp-content/uploads/2018/05/coal-ash-hazardous-to-human-health.pdf>

07. http://www.cea.nic.in/reports/others/thermal/tcd/flyash_201617.pdf

08. http://www.undp.org/content/dam/india/docs/analysis_of_existing_environmental_instruments_in_india.pdf (Page 22)

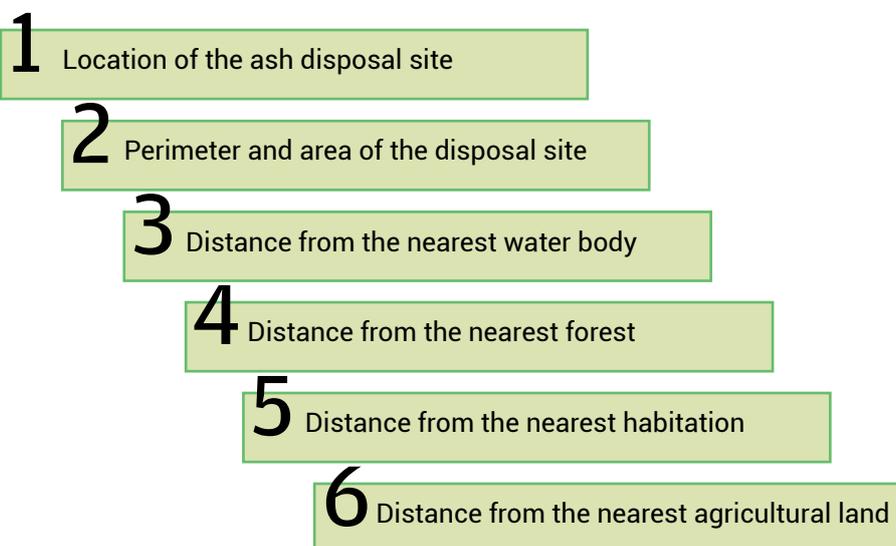
09. http://www.cea.nic.in/reports/others/thermal/tcd/flyash_201617.pdf Preface

10. <http://krishikosh.egranth.ac.in/bitstream/1/2058761/1/NAARM%2034.pdf>

11. http://www.undp.org/content/dam/india/docs/analysis_of_existing_environmental_instruments_in_india.pdf

1. METHODOLOGY

The fly ash disposal sites were identified by looking at areas near thermal power plants located in the eastern India on Google Earth. A polygon for each disposal sites was drawn to assess each ash disposal site based on the following parameters:



Using QGIS 3.4.3, each location was overlapped on the Seismic Zone map, Floodplain Map and Wind & Cyclone map of India and sites were further classified in Different ranges.

2. OBSERVATION

By scanning the area around each of the 32 thermal power plant located in eastern India using Google Earth, a total of 74 ash disposal sites were identified. This includes fly ash pond and other disposal sites that may be both authorised and unauthorised. The total identified fly ash disposal sites are shown in Plate 1 and the details of thermal power plant-wise associated fly ash disposal site and their total areas are given in Table-1. Location of fly ash disposal sites in eastern India (Plate 1) and state-wise map of location of ash disposal site has been given in Annexure-I.

Table-1: Names and designated codes of the power plants along with the number and area of associated fly ash disposal sites

Sl. No	State	Name of the Plant	Designated Code	No. of ash disposal sites identified	Total Area (Hectares)
1	BIHAR	BARAUNI TPS	BR_T1	6	129.39
2	BIHAR	BARH II STPP	BR_T2	1	661
3	BIHAR	KAHALGAON TPS	BR_T3	1	520
4	BIHAR	MUZAFFARPUR TPS	BR_T4	1	76
5	JHARKHAND	BOKARO `A` TPS	JH_T1	2	72
6	JHARKHAND	CHANDRAPURA (DVC)	JH_T2	1	84
7	JHARKHAND	JOJOBERA TPS	JH_T3	4	26.87
8	JHARKHAND	KODARMA TPP	JH_T4	2	66
9	JHARKHAND	MAHADEV PRASAD STPP	JH_T5	9	30.6
10	JHARKHAND	MAITHON RB TPP	JH_T6	1	102
11	JHARKHAND	PATRATU SUPER TPP	JH_T7	1	29

12	JHARKHAND	TENUGHAT TPS	JH_T8	6	73.5
13	ODISHA	ADITYA ALUMINIUM	OR_T1	4	33.7
14	ODISHA	DERANG TPP	OR_T2	3	619
15	ODISHA	IB VALLEY TPS	OR_T3	2	220
16	ODISHA	KAMALANGA TPS	OR_T4	3	104.6
17	ODISHA	STERLITE TPP	OR_T5	4	175.7
18	ODISHA	TALCHER (OLD) TPS	OR_T6	1	242
19	WEST BENGAL	BAKRESWAR TPP	WB_T1	2	172
20	WEST BENGAL	BANDEL TPS	WB_T2	1	30
21	WEST BENGAL	BUDGE BUDGE TPS	WB_T3	1	27
22	WEST BENGAL	D.P.L. TPS	WB_T4	2	87
23	WEST BENGAL	DURGAPUR STEEL TPS	WB_T5	1	55
24	WEST BENGAL	DURGAPUR TPS DVC	WB_T6	1	76
25	WEST BENGAL	FARAKKA STPS	WB_T7	2	166
26	WEST BENGAL	HALDIA ENERGY LIMITED	WB_T8	1	3.5
27	WEST BENGAL	HALDIA TPP	WB_T9	1	4.7
28	WEST BENGAL	KOLAGHAT TPS	WB_T10	4	68.1
29	WEST BENGAL	MEJIA TPS	WB_T11	1	202
30	WEST BENGAL	RAGHUNATHPUR TPP	WB_T12	1	109
31	WEST BENGAL	SAGARDIGHI TPS	WB_T13	2	171
32	WEST BENGAL	SANTALDIH TPS	WB_T14	2	81
Total				74	4517.66

2.1 Fly ash pond area not mentioned in EC letter

The Environmental Clearance (EC) letter and associated documents of EC process for these 32 power plants, whichever available in public domain, have been checked. Surprisingly, any quantification regarding the area of fly ash pond is not mentioned in the EC letters. Among the 32 thermal power plants, the area of fly ash pond has been specified in two cases, that too in the Environmental Impact Assessment (EIA) report and in Pre-Feasibility Report (PFR), Form 1. As per the EIA report of the Baruni thermal power plant in Bihar¹², the fly ash pond area is 117 ha, whereas our analysis estimates it to be 129.39 ha. This difference might be attributed to unauthorised disposal, or calculation error. Similarly, our analysis shows that only 29 ha is occupied by fly ash in Patratu Thermal Power Station in Jharkhand whereas the Form 1 of this project mentioned land availability for ash as 144.5 ha including the green belt¹³.

12. <http://environmentclearance.nic.in/writereaddata/EIA/11181255121612X250BarauniEIAReport.pdf>

13. http://environmentclearance.nic.in/writereaddata/form-1/18_Patratu-form1.pdf

2.2 Area under fly ash disposal sites

The total area occupied by the 74 ash disposal sites in eastern zone is approximately 4517.66 ha (Table-2). The highest number of ash disposal sites are in the state of Jharkhand (26) but the highest area under the fly ash disposal site is in Odisha (1395 ha).

Table-2: Summary of fly ash disposal sites

State	Fly Ash disposal site (no. and area in ha)		
	Numbers (n)	Sum (Σ)	Average (\bar{x})
Bihar	9	1386.39	154.04(0.39 – 661)
Jharkhand	26	483.97	18.61(0.31 – 102)
Odisha	17	1395	82.06(2 – 269)
West Bengal	22	1252.3	56.92(3 – 202)
Total (Eastern Zone)	74	4517.66	61.05(0.31-661)

The area under fly ash disposal is approximately 1,400 ha each in Odisha and Bihar followed by 1,200 ha area in West Bengal and 600 ha in Jharkhand. The average size of ash disposal sites in Bihar, Jharkhand, Odisha and West Bengal are 154.04 ha, 18.61ha, 82.06ha and 56.92 ha respectively (Table-2). In some cases, numerous small patches of fly ash disposals have been identified which appears to be unorganized and illegal dumping of fly ash in the region.

Patch size-wise analysis of fly ash disposal sites shows that 21 sites have area less than 5 ha, and only two patches with more than 500 ha are located in Bihar (Table-3).

Table-2: Summary of fly ash disposal sites

Patch size	Bihar	Jharkhand	Odisha	West Bengal	Total
<5 ha	2	12	3	4	21
>5 - ≤ 20 ha	2	8	6	1	17
>20 - ≤ 50 ha	1	2		7	10
>50 - ≤100 ha	2	3	4	6	15
>100 - ≤200 ha		1		3	4
>200 - ≤500 ha			4	1	5
> 500 ha	2				2
Total	9	26	17	22	74

2.3 Habitation and fly ash disposal sites

Analysis of fly ash disposal sites shows that in 57% of these sites are within 500 m from human habitation. In about 19% cases, fly ash is being dumped between 500 meters to 1 km from the human habitation. (Figure-1).

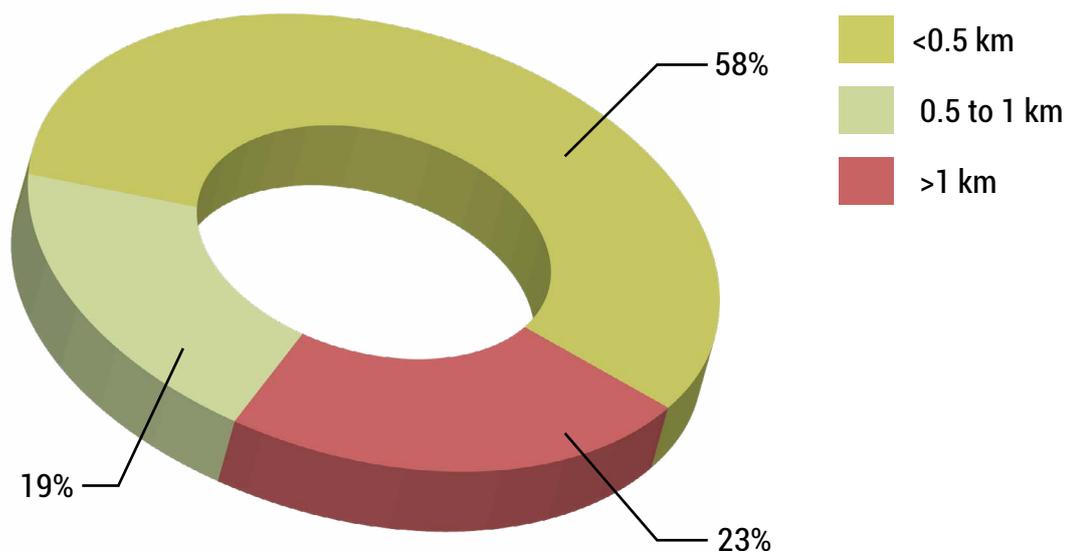


Figure 1: Percentage shares of fly ash disposal site per their distance from human habitation.

Jharkhand sees the highest share of fly ash dumping near habitation, followed by West Bengal. In Jharkhand, Odisha and West Bengal 77%, 41% and 55% cases of fly ash dumping are within 500 m from different habitation respectively (Figure 2). Location of such fly ash disposal sites in proximity to human habitation can cause serious health issues¹⁴.

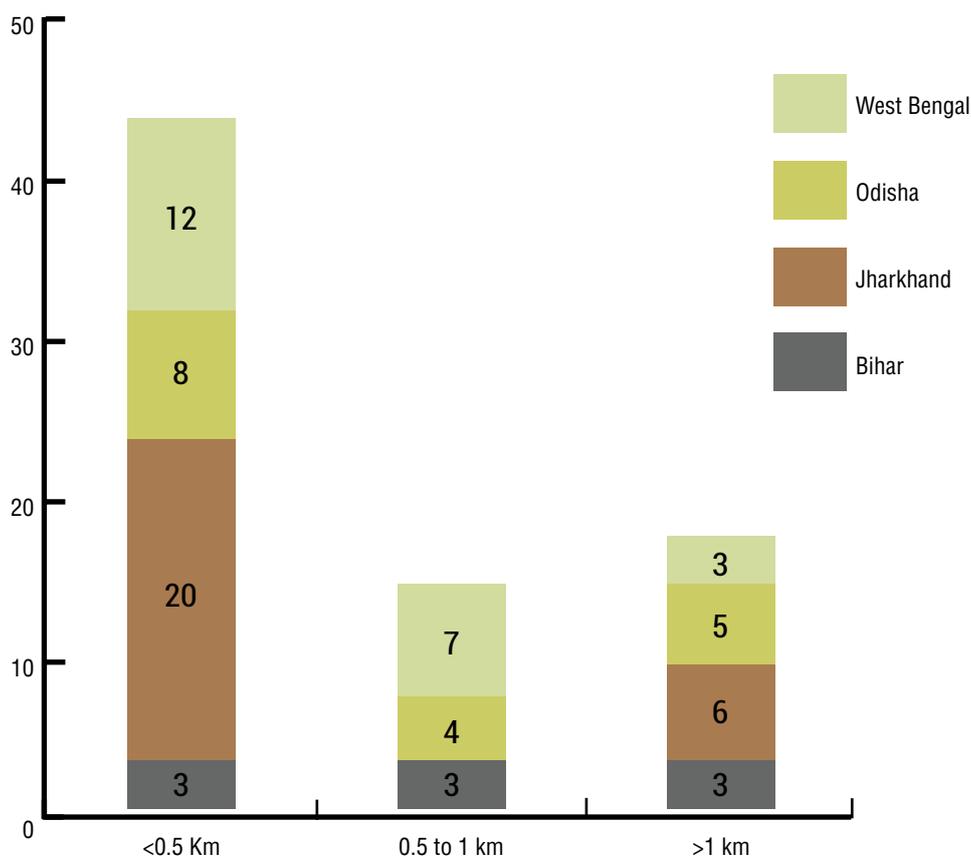


Figure 2: Distance-wise location of fly ash disposal sites from nearest habitation

14. https://content.sierraclub.org/coal/sites/content.sierraclub.org/coal/files/elp/docs/us-general_epa-coal-ash-report_2007-8-6.pdf

2.4 Agricultural lands and fly ash disposal sites

Analysis of fly ash disposal with respect to agricultural land shows that almost 43% of fly ash disposal sites in eastern zone are surrounded by the agricultural lands. In Odisha, 13 out of 17 identified fly ash dumps are surrounded by agricultural lands whereas in West Bengal the count is 12 out of 22 (Figure 3). Proximity to such fly ash disposal sites is a direct threat to agricultural land during any disaster. For example, the fly ash dyke breach in Jharsugda in August 28, 2017 caused permanent loss of 80 acres agricultural land.

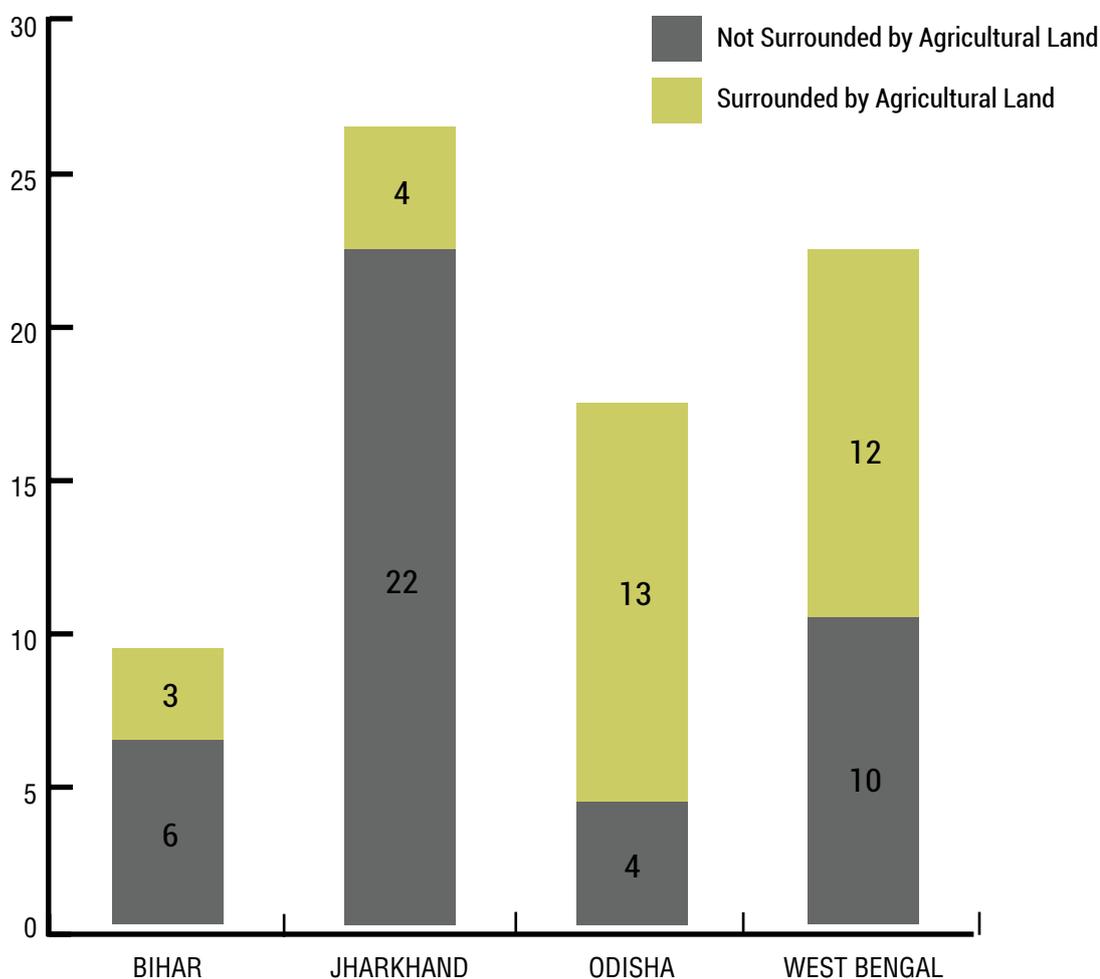


Figure 3: State-wise number of the fly ash disposal sites surrounded by agricultural land

2.5 Forest land and fly ash disposal sites

In eastern zone, 6% fly ash disposal sites are within 500 meter from the forest or protected areas¹⁵. Mejia Thermal Power Station (TPS) in West Bengal has its ash pond just beside Gangajalghati Forest. In Odisha, ash disposal of Aditya Aluminium and Power Plant has an average distance of 250 m from Ushakothi Wildlife Sanctuary. Ash disposal of Chandrapura of Damodar Valley Corporation (DVC) and Bokaro `A` Thermal Power Station in Jharkhand is just 250 m away from some unclassified forest (visible in Google Map). However, as Bihar state has less forest cover, most of the ash disposal sites are situated more than 10 km away from the forest boundary. Along with fugitive dust emission from fly ash, these forest are vulnerable to accidental breaches. This is evident from the incident of fly ash dyke breach in Jharsugda on August 28, 2017, which showed that fly ash can reach as far as 650-700 m distance (measured through Google Earth Time Series Map) after breaching.

15. https://content.sierraclub.org/coal/sites/content.sierraclub.org/coal/files/elp/docs/us-general_epa-coal-ash-report_2007-8-6.pdf

2.6 Water bodies and ash disposal sites:

In eastern India, about 12% of fly ash dumping is near river/water bodies. About, 20% of fly ash dumping sites are within 100 m distance from a water body (Figure 4). Hence, there is a high chance of contamination of water body by fly ash leachate or spill^[16].

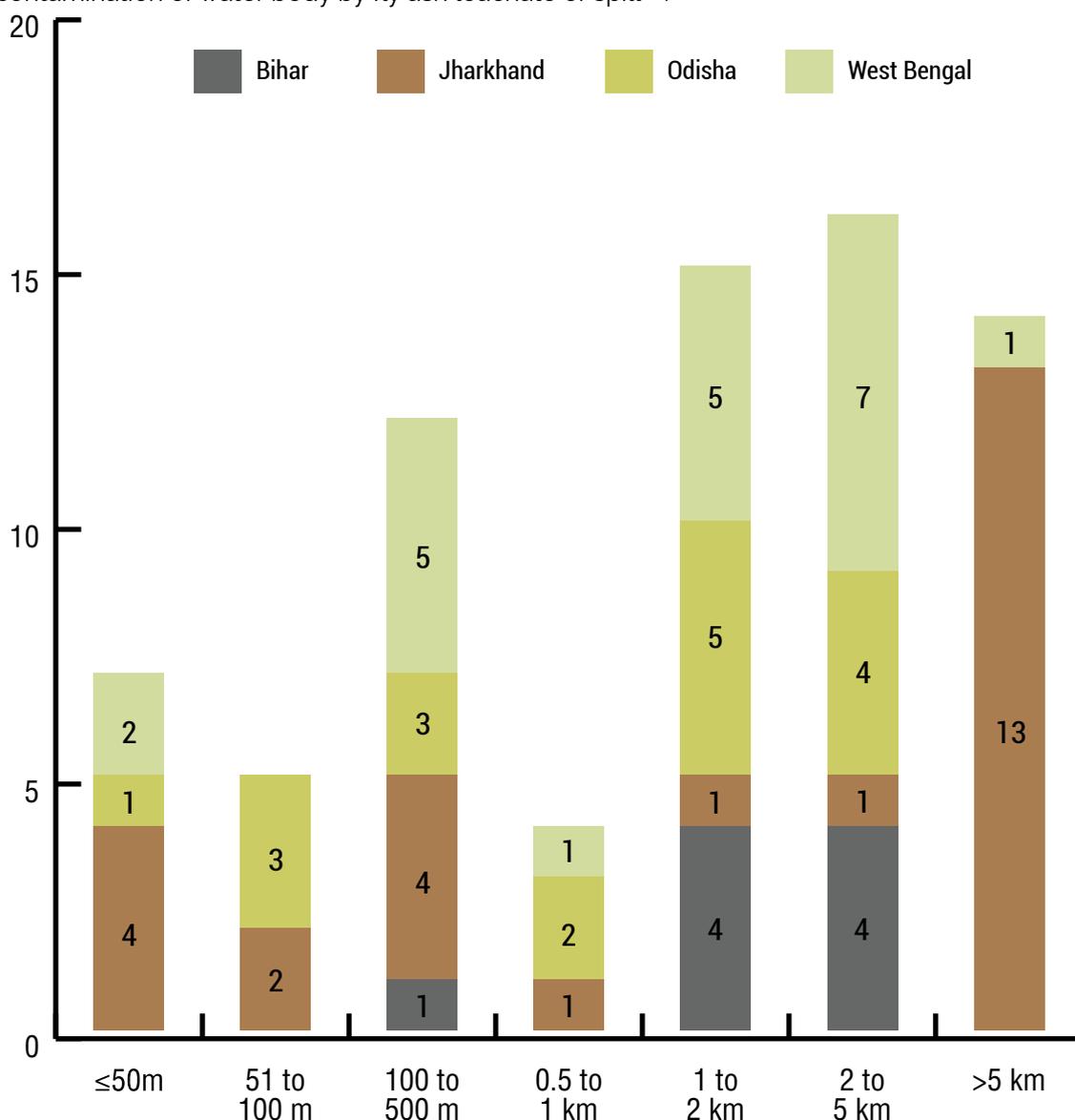


Figure 4: Fly ash disposal sites as per their distance from the nearest water bodies

Jharkhand and West Bengal have the highest cases of fly ash dumping on river banks. There are total 13 disposal sites identified within 500 m distance of Ganga River and its tributary (Table 6). Six of these disposal sites are near Damodar River, two near Ganga River, one site each near Hoogly and Tikera rivers and three sites near Rupnarayan River (Figure 5). Within 5 km, there are 10 fly ash disposal sites near the Ganga River, nine fly ash disposal sites near Damodar River, and six near Hoogly River.

16. https://www.researchgate.net/publication/269719745_Damage_cost_of_the_Dan_River_coal_ash_spill

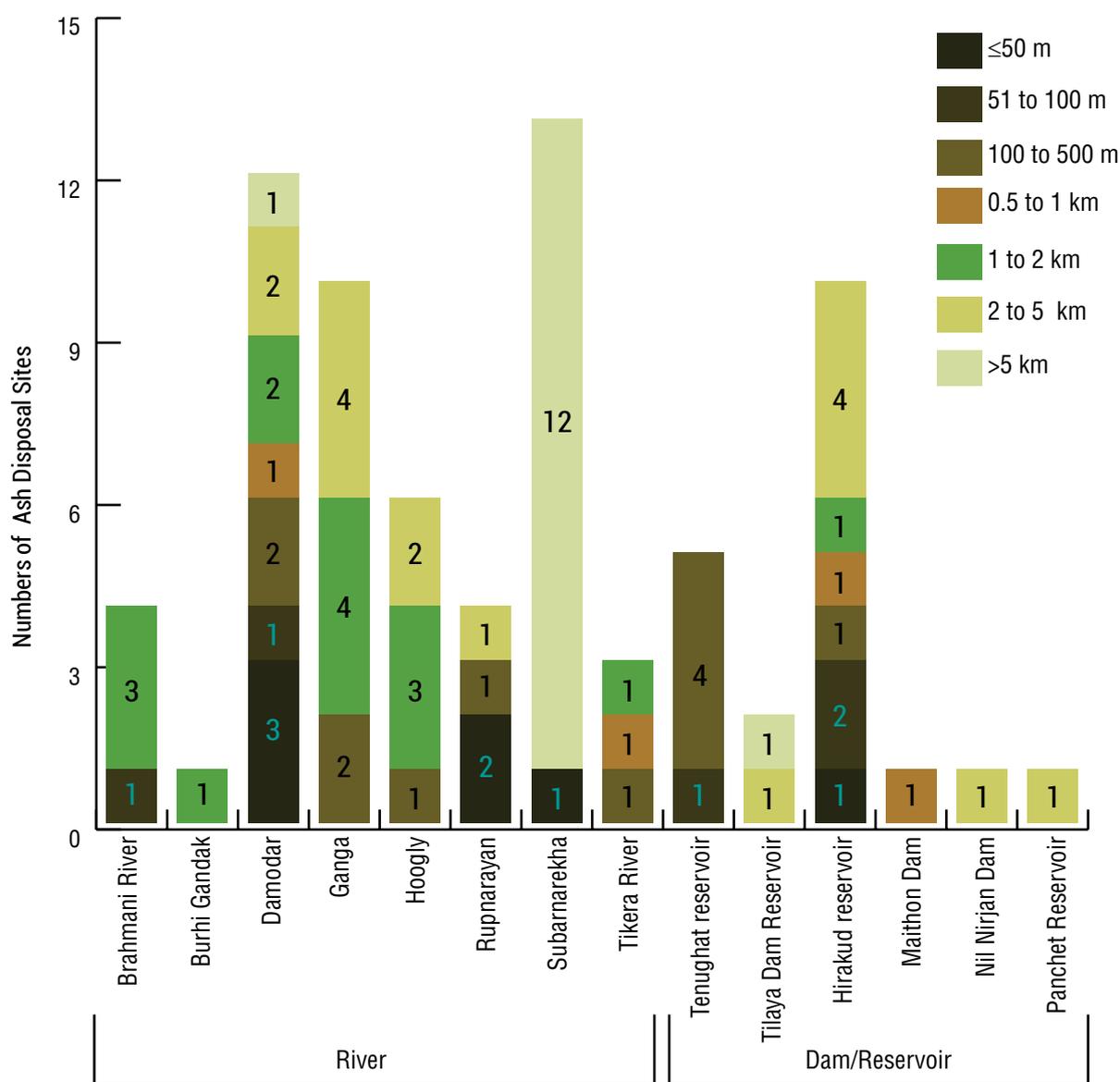


Figure 5: Number of ash disposals and their distance range from different Water Body in eastern zone

Table 4: Fly ash disposal on the banks of Ganga and its tributaries

State	Name Of Power plant	Ash Pond	Name of the Water Body	Distance (m)
Jharkhand	Chandrapura (DVC)	1	Damodar	100
	Tenughat	1	Tenughat reservoir	100
		2	Tenughat reservoir	120
		3	Tenughat reservoir	120
		4	Tenughat reservoir	130
		5	Tenughat reservoir	200
Bihar	Barauni	1	Ganga	350
West Bengal	Budge Budge	1	Hoogly	160
	D.P.L.	1	Damodar	230
	Farakka	1	Unnamed canal to Ganga	330
	Durgapur (DVC)	1	Damodar	350

In some cases, such as Chandrapura (Damodar Valley Corporation), Tenughat Thermal Power Station in Jharkhand, Barauni Thermal Power Station in Bihar, and Durgapur Thermal Power Station of DVC, Budge Budge Thermal Power Station, D.P.L. Thermal Power Station, Farakka Super Thermal Power Station in West Bengal, the fly ash disposal have been identified just on the bank of River Ganga or its tributaries (Table 5) or in vicinity of the riverbank. Apart from rivers, dams, lakes and reservoirs are also exposed to the fly ash. The present investigation shows that rivers Ganga, Damodar and Hoogly, Hirakud Dam and Tenughat reservoir have high chance of exposure to fly ash, as total 13 ash disposals have been identified just within 500 m from any of the mentioned water body. Number of ash disposal sites and power plants identified with respect to their distance from nearby water body has been presented in detail in Table 5.

Table 5: Number of ash disposal sites and power plants identified with respect to distance range and nearby water body.

Water Body ("*" – Ganga and Its Tributaries)	Power plant	State	Numbers of ash disposal sites in Different Distance Range							
			≤50m	51-100 m	100-500 m	0.5-1 km	1-2 km	2-5 km	>5 km	
Rivers	Brahmani River	Kamalanga TPS	Odisha					3		
		Talcher (old) TPS	Odisha		1					
	BurhiGandak	Muzaffarpur TPS	Bihar					1		
	Damodar*	Bokaro `A` TPS	Jharkhand	1				1		
		Chandrapura (DVC)	Jharkhand		1					
		D.P.L. TPS	West Bengal			1			1	
		Durgapur Steel TPS	West Bengal					1		
		Durgapur TPS DVC	West Bengal			1				
		Mejia TPS	West Bengal							1
		Patratu Super TPP	Jharkhand	1						
		Santaldih TPS	West Bengal				1		1	
		Tenughat TPS	Jharkhand	1						
		Ganga*	Barauni TPS	Bihar			1		3	2
	Barh II STPP		Bihar						1	
	Farakka STPS		West Bengal			1		1		
	Kahalgaon TPS		Bihar						1	
	Hoogly*	Bandel TPS	West Bengal					1		
		Budge Budge TPS	West Bengal			1				
		Haldia Energy Limited	West Bengal					1		
		Haldia TPP	West Bengal					1		
		Sagardighi TPS	West Bengal						2	
	Rupnarayan	Kolaghat TPS	West Bengal	2		1			1	
	Subarnarekha	Jojobera TPS	Jharkhand							4
Mahadev Prasad STPP		Jharkhand	1						8	
Tikera River	Derang TPP	Odisha			1	1	1			

Water Body ("*" – Ganga and Its Tributaries)	Power plant	State	Numbers of ash disposal sites in Different Distance Range						
			≤50m	51-100 m	100-500 m	0.5-1 km	1-2 km	2-5 km	>5 km
Dam/Reservoir	Tilaya Dam	Kodarma TPP						1	1
	Hirakud reservoir	Aditya Aluminium	Odisha					4	
		IB Valley TPS	Odisha		2				
		Strelite TPP	Odisha	1		1	1	1	
	Maithon Dam	Maithon RB TPP	Jharkhand				1		
	NilNirjan Dam	Bakreswar TPP	West Bengal					1	
	Panchet Reservoir	Raghunathpur TPP	West Bengal					1	
Tenughat reservoir*	Tenughat TPS	Jharkhand		1	4				

3. FLY ASH DISPOSAL IN DISASTER ZONES

Overlapping the locations of ash disposal on the seismic zone map, floodplain map and wind and cyclone map of India using OGIS 3.4.3. It is found that in eastern India, out of total 74 ash disposals identified, 11 sites (nine in Bihar and two in West Bengal) are located in High Damage Risk Earthquake Zone- Zone IV (MSK VIII)¹⁷. Fly ash disposal sites of Barauni Thermal Power Station, Barh II Super Thermal Power Project and Kahalgaon Thermal Power Station of Bihar and Haldia Thermal Power Project and Kolaghat Thermal Power Station of West Bengal are located on a sub-surface fault (Figure 6.) In case of Jojobera Thermal Power Station and Mahadev Prasad Super Thermal Power Project of Jharkhand fly ash disposals sites are located in the Shear zone.

17. Medvedev–Sponheuer–Karnik scale, also known as the MSK or MSK-64, is a macroseismic intensity scale used to evaluate the severity of ground shaking on the basis of observed effects in an area of the earthquake occurrence.

Fly Ash Disposal Sites in Eastern India (Earthquake Hazard Map)

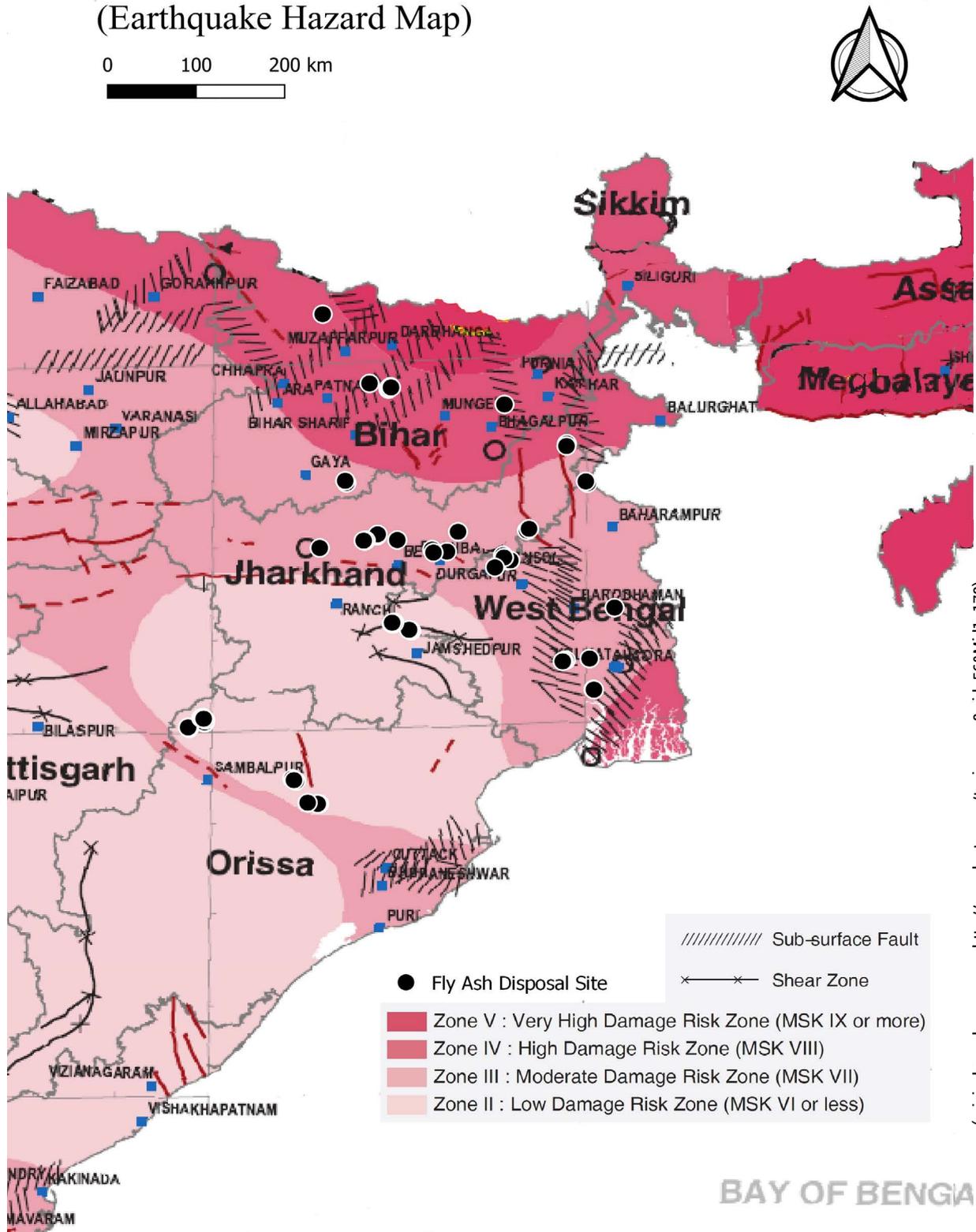


Figure 6: Fly ash disposal sites in eastern India superimposed on earthquake hazard map

In the same manner, 22 sites (eight in Bihar and 14 in West Bengal) are located in floodplains (Figure 7) of various rivers—Hoogly, Subarnarekha and Damodar River in West Bengal and BurhiGandak and Ganga in Bihar.



Figure 7: Fly ash disposal sites in eastern India superimposed on flood zone map.

Figure 8 shows location of various fly ash disposal sites in various wind and cyclone zone in Eastern India. It can be seen that seven disposal sites in West Bengal are located in very high damage risk wind and cyclone zone i.e. Zone - B ($V_b = 50\text{m/s}$) and 28 sites (9 in Bihar, 4 in Jharkhand and 15 in West Bengal) is located in high Damage Risk wind and Cyclone zone i.e. $V_b = 47\text{m/s}$.

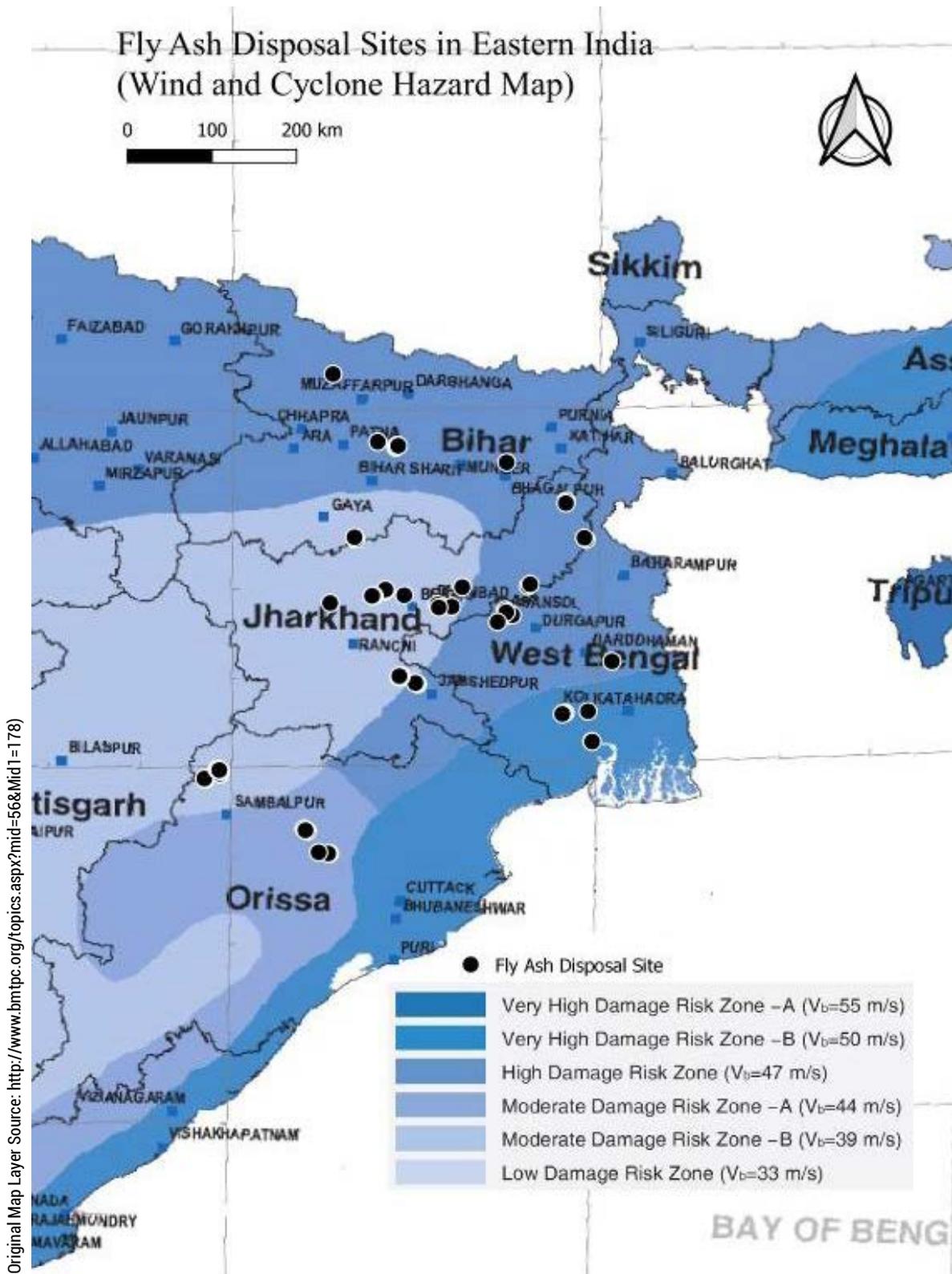


Figure 8: Fly ash disposal sites in eastern India overlapped on wind and cyclone hazard map

Table 6: Fly ash disposal sites in eastern India overlapped on wind and cyclone hazard map

	BIHAR	JHARKHAND	ODISHA	WEST BENGAL
Earth quake Zone				
Zone II: Low Damage Risk Zone (MSK VI or less)		13	17	
Zone III: Moderate Damage Risk Zone (MSK VII)		13		20
Zone IV: High Damage Risk Zone (MSK VIII)	9			2
Flood Zone				
No	1	26	17	8
Yes	8			14
Wind And Cyclone Zone				
Very High Damage Risk Zone - B (Vb = 50m/s)				7
High Damage Risk Zone (Vb= 47m/s)	9	4		15
Moderate Damage Risk Zone - A (Vb = 44m/s)			7	
Moderate Damage Risk Zone - B (Vb = 39 m/s)		22	10	

4. CONCLUSION

This study shows that around 4518 ha of land in eastern India is under fly ash disposal sites, which is more than the entire area of New Delhi (4270 ha). The land requirement for fly ash disposal is 0.17 ha/MW against national average of 0.405 ha/MW^[18]. For states the average figures come to 0.37ha/MW in Bihar, 0.09ha/MW in Jharkhand, 0.3ha/MW in Odisha and 0.11ha/MW in West Bengal.

Large numbers of habitations, forests, water bodies and agricultural lands are directly exposed to the pollution from fly ash disposal sites because of their locations.

In Jharkhand, Odisha and West Bengal, 77%, 41% and 55% cases of ash dumping respectively are within 500 m from habitation. For the entire eastern zone, fly ash disposal is happening just within 500 m in average 58% cases.

For Odisha and West Bengal, agricultural land is likely to be affected by fly ash disposal in 76% and 54% cases respectively. This will cause loss of productivity if any major disaster happens.

Mejia Thermal Power Station in West Bengal has its ash pond beside the Gangajalghati Forest. In Odisha, ash disposal of Aditya Aluminium and Power Plant has an average distance of 250 m from Ushakothi Wildlife Sanctuary. Ash Disposal of Chandrapura (DVC) and Bokaro 'A' Thermal Power Station in Jharkhand is just 250 m away from some unclassified open forest.

Within 50 m from Damodar, Rupnarayan, Subarnarekha rivers three, two and one disposal sites have been identified respectively. If dams or reservoirs are considered, Hirakud Dam in Odisha has three ash disposals and Tenughat reservoir in Jharkhand has one ash disposal within 100 m distance.

According to River Ganga (Rejuvenation, Protection and Management) Authorities' order, from 2016, "No person shall discharge, directly or indirectly, any untreated or treated trade effluent and industrial waste, bio-medical waste, or other hazardous substance into the River Ganga or its tributaries or on their banks."

18. http://www.undp.org/content/dam/india/docs/analysis_of_existing_environmental_instruments_in_india.pdf (Page 22)

However, it is evident from the study that fly ash is being dumped on the banks of Damodar River and Tenughat reservoir, by Chandrapura (DVC) and Tenughat Thermal Power Station respectively. In Bihar, Barauni Thermal Power Station is also dumping fly ash in close vicinity to Ganga River. In West Bengal Ash dumping is being done by Budge Budge Thermal Power Station near the bank of Hoogly River, D.P.L. Thermal Power Station and Durgapur Thermal Power Station of DVC near the bank of Damodar and by Farakka Super Thermal Power Station just beside an unnamed canal connected with Ganga.

Siting restriction with regards to Coal Ash (Coal Combustion Residuals or CCR) in landfills and solid waste disposal have been stipulated in Federal Coal Ash Rule and Federal Solid Waste Disposal Facility of the United States Environmental Protection Agency (EPA)^[19]. They have considered several factors such as seismic impact zones, fault areas, floodplains.

EPA stipulates that a coal ash landfill must not be in seismic impact zones unless the owner or operator complies with all structural components including liners, leachate collection and removal systems, and surface water control systems. The unit should be capable of resisting the maximum horizontal acceleration in lithified earth material for the site. Coal ash landfill must not be located within 60 meters (200 feet) of the outermost damage zone of a fault that has had displacement in Holocene time unless the owner or operator can come with an alternative setback distance of less than 60 meters (200 feet) ensuring the prevention of damage to the structural integrity of the CCR unit.

The order also states that practices in floodplains must not restrict the flow of the base flood, reduce the temporary water storage capacity of the floodplain, or result in washout of solid waste, in a way that poses hazard to human life, wildlife, or land or water resources.

This study shows that out of total 74 ash disposals identified, 11 sites (nine in Bihar and two in West Bengal) are located in high damage risk earthquake zone or Zone IV (MSK VIII). Total 13 disposals are on the sub surface fault zone. Of the total, 22 sites (eight in Bihar and 14 in West Bengal) are located within floodplains of various rivers. Seven disposal sites in West Bengal is located in very high damage risk wind and cyclone zone [Zone - B ($V_b = 50\text{m/s}$)]. Of the total, 28 sites (9 in Bihar, 4 in Jharkhand and 15 in West Bengal) are located in high damage risk wind and cyclone zone ($V_b = 47\text{m/s}$).

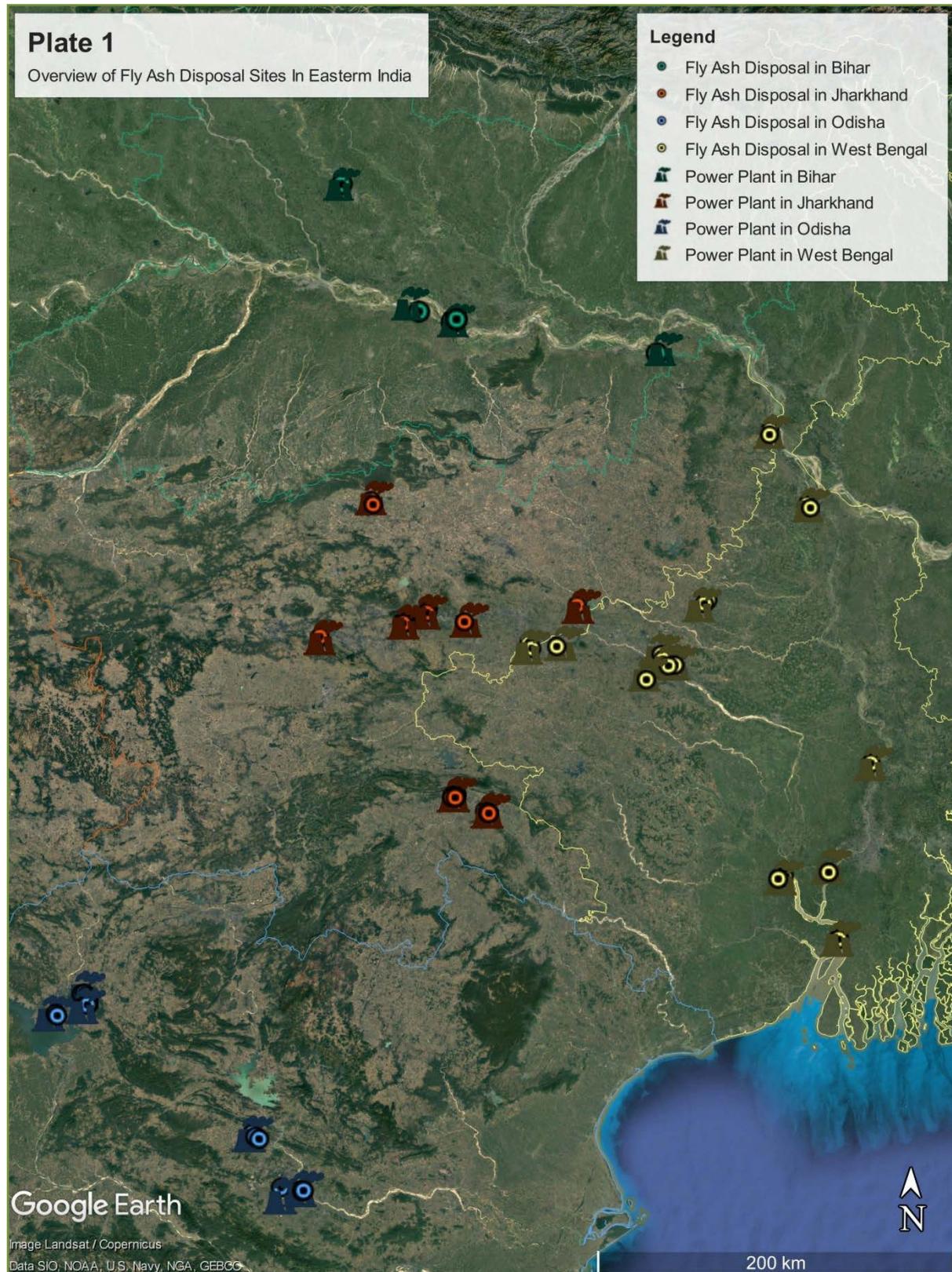
It is evident that the dumping of fly ash in eastern India is happening across diverse regions, in an unplanned and uncontrolled. There is no proper regulation or guidelines regarding fly ash disposal, methods and techniques except in the Environmental Guidelines for Thermal Power Plants, 1987^[20]. That too specifies only two guidelines on fly ash disposal:

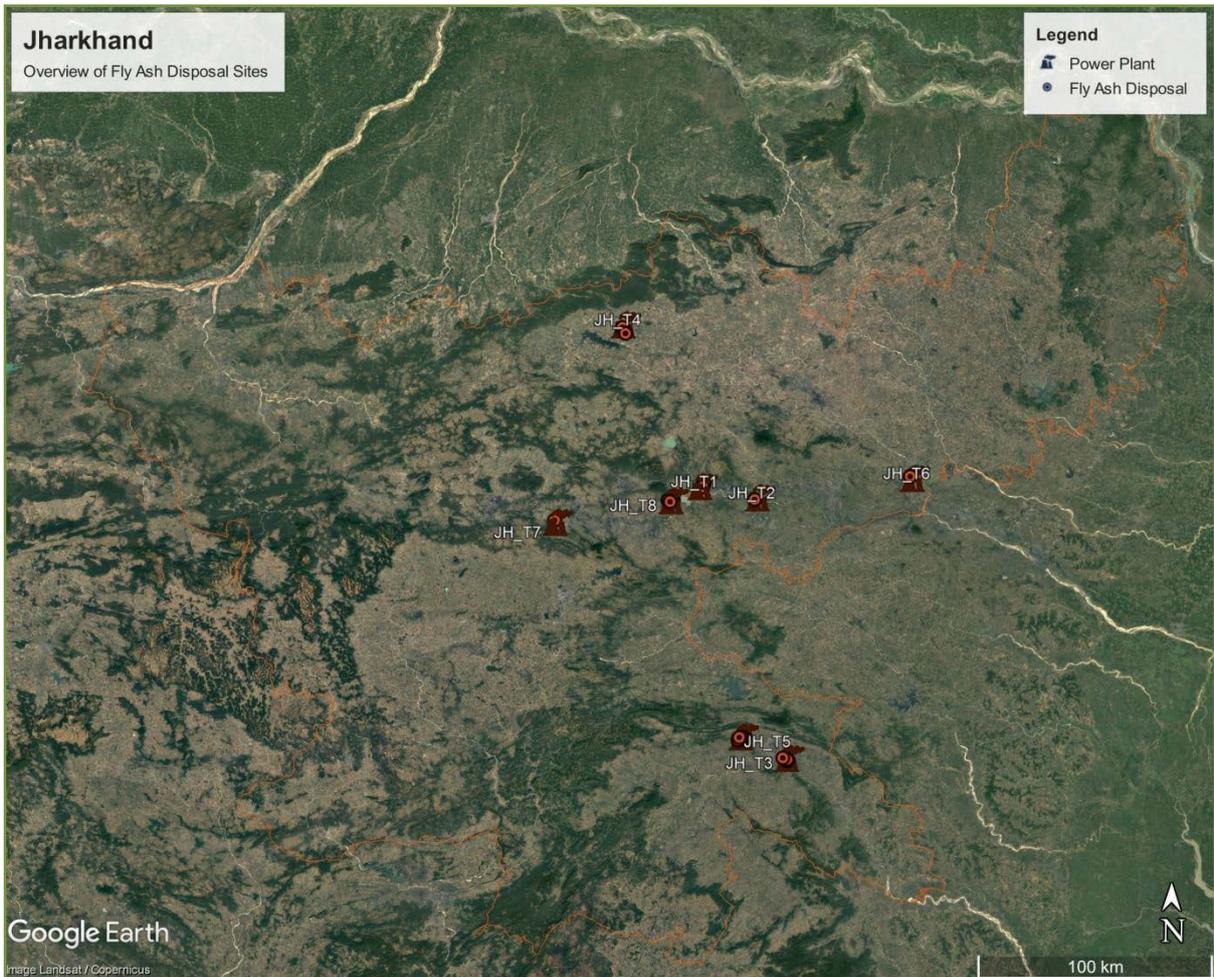
1. "No forest or prime agricultural land should be utilized....for ash disposal" and
2. "Ash disposal areas should be planned downwind of villages and townships".

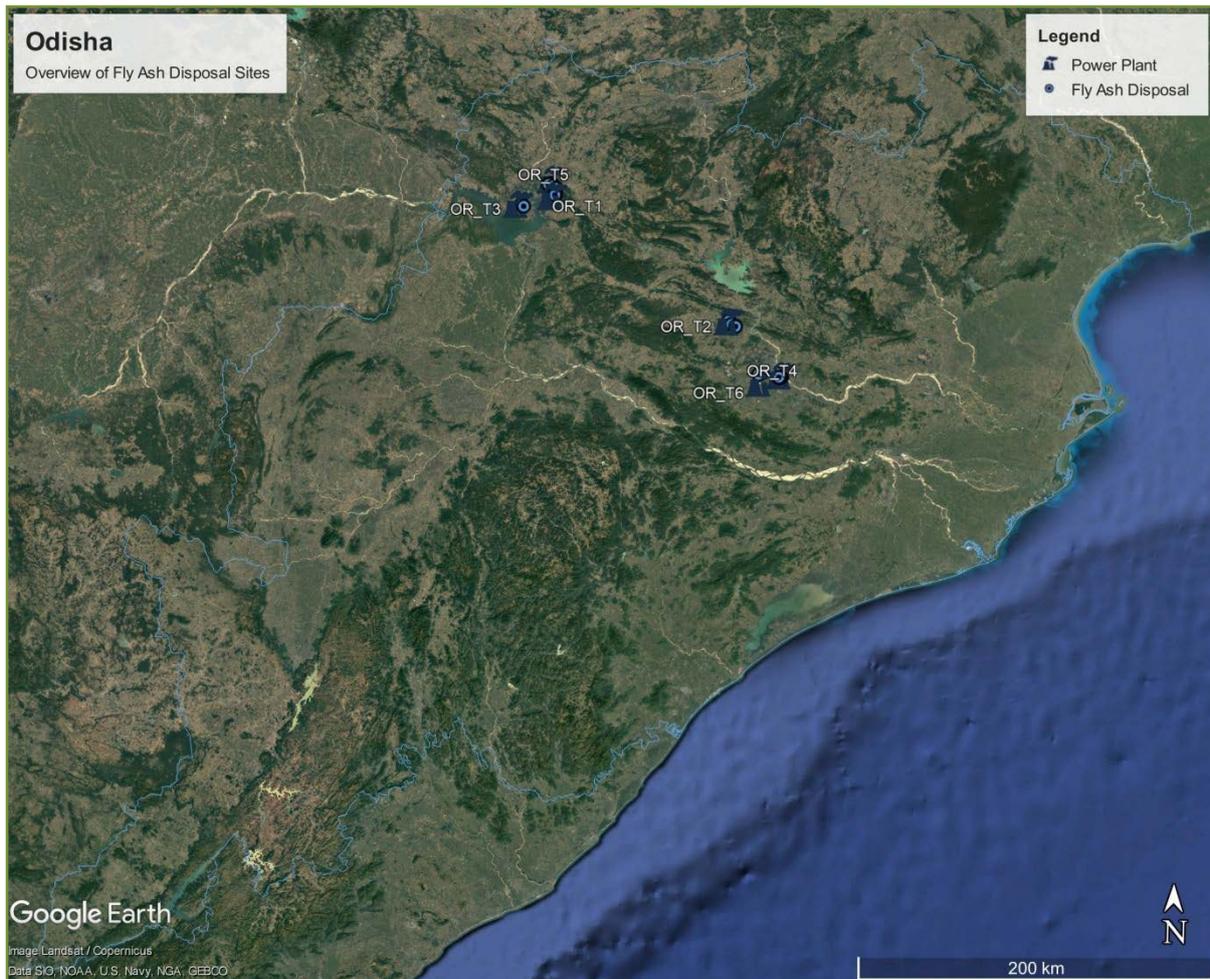
The study clearly shows that in absence of any specific siting guidelines on habitation, water bodies, forest and agricultural land, the fly ash disposal sites are selected without due diligence. Therefore, there is an urgent need to frame siting guidelines for establishment of fly ash disposal sites in India.

20. <https://vindhyaachao.org/embeds/thermal/Environment-Guidelines-MoEF-1987.pdf>

ANNEXURE 1











End cover photo by Ankit Kumar



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