IMPACTS OF SEVERE WEATHER EVENTS ON IMPLEMENTING THE WASTE HIERARCHY – The case of eThekwini metropolitan municipality

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our future through science

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Lena Ahrens Road (Manning Rd), Glenwood, eThekwini (source - press)

On 9th October 2017, eThekwini metro was hit by a massive storm which left 5 dead and at least 18 others injured



Damage at Durban Solid Waste deputs including also at the landfill sites (Mariannhill) Lovu, Buffelsdraal and Bisasar Road landfill) and other solid waste management intrastructure and plant was reported totalling R1 398 million Rand

Approximately 60 wards comprising 3 112 households mostly in the South of the metro were affected.

Collapsed wall outside King Edward Hospital in eThekwini (source - press)

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- Waste management is vulnerable to climate change logistical complexity of solid waste removal and disposal systems.
- Extreme weather events potentially damage municipal assets (collection vehicles, landfills, road, water and sanitation).
- Waste Department has to deal with the debris and waste that remains.
- Exacerbate public health concerns (stagnant water and organic waste).
- Debris contribute to stress in the communities affected.



Impacts:

- Increased risks of <u>flooding</u>, localised <u>disruption of waste collection rounds</u>, (reaching waste treatment and disposal facilities).
- Recyclate <u>Potential loss of value (degradation of paper, cardboard due</u> to increased moisture content and contamination).
- <u>Health and safety</u> issues for communities and staff, odour.
- High winds increase nuisance due to dispersion.
- Increased risk of fires (lightning at landfills).
- Flooding or overflowing leachate control systems at landfill.
- Developing countries have constrained resources and limited responses.
- Lack of data in Developing countries.



Policy Context

Policy & legislation:

- A disaster is either <u>progressive</u> or <u>sudden</u>, <u>widespread</u> or <u>localised</u>, <u>natural</u> or <u>human-induced</u>, which results in <u>death or injury</u>, damage to property, disruption to community infrastructure or the environment [Disaster Management Act 2002 (Act No 57 OF 2002)].
- <u>Integrated and coordinated approach</u> (between national government and local municipalities) to disaster management, <u>reducing risk and severity</u>, <u>facilitating emergency preparedness</u>, recovery, national, provincial and municipal disaster management centres, and disaster management volunteers [Amended Disaster Management Amendment Act, No. 16 of 2015].



Policy Context

Policy & legislation:

- eThekwini's disaster management plan needs to give effect to the National legislation.
- eThekwini's disaster management plan is only a framework document to be supported by other detailed plans (to outline Risks, services during emergencies, staff availability, handling haz waste,).
- Major concern expressed by the Disaster Management department is that not all the departments have finalised detailed departmental plans to respond to emergency situations.



Housing Structures at Risk

Type of Dwellings in eThekwini (source: eThekwini Municipality, 2016)

Type Of Dwelling	Household	%	
House or brick structure/ concrete block structure on a separate stand or yard or on a farm Traditiona	l 592 990	62	
Traditional dweining/ nut/ structure made of traditional materials	40 168	4.Z	-
Flat or apartment in a block of flats	95 027	9.9	
Cluster houses in complex	15 704	1.6	
Townhouse (semi-detached house in a complex)	10 580	1.1	
Semi-detached house	17 956	1.9	
House/ flat/ room in backyard	17 435	1.8	
Informal dwelling (shack; in backyard)	37 981	4	
Informal dwelling (shack; not in the backyard; e.g. In an informal/squatter settlement or on a farm)	111 307	11.6	
Room/ flat let on a property or larger dweiling/ servants quarters/ granny flat	6 464	0.7	
Caravan/ tent	733	0.1	
Other	10 348	1.1	
TOTA	AL 956 713		

- Formal housing makes up the bulk of the housing stock in the Metro.
- Informal structures are frequently composed of wood, cardboard, metal sheets, mud and plastics



Housing Structures at Risk

- Informal housing structures in <u>formal</u> and <u>informal settlements</u> generally not compliant with building regulations and these tend to be prone to failure and damage due to their poor structural integrity (The Housing Development Agency, 2013).
- It should be noted that informal dwellings within a backyard (also known as '<u>shack</u> <u>farming</u>' in other cities) are also at risk.
- Informal developments for the vulnerable in <u>1:100-year flood line, wetland, steep</u> or unstable slopes are also at risk (displacement) (White, Turpie & Letley, 2017).
- <u>Prevention best option</u>. Limiting informal housing developments in floodplains (or drainage lines), maintenance and regular clearing of storm water systems, enforcement of building standards. Unfortunately, out of the control of waste managers (although disaster management is a collective responsibility). <u>Collaboration is important</u>.







Challenges - AVAILABLE DATA

- "Every waste category that is generated has its own disposal challenges during normal condition. With the effect of the disaster, these ... usually create new mixed categories that will increase ... complexity" Agamuthu et al (2015: 2)
- Existing data from the IWMP is too course & does not allow us to interrogate changes in SWM generation during disaster storm events.



Combined Landfilled Quantities (Source: eThekwini Municipality, 2016b)

Landfill		2013 Tons	%	2014 Tons	%	2015 Tons	%	TOTAL Tons	%
Domestic Solid Waste ²		593 994	41	565 862	42	586 045	46	1 745 984	43
General Solid Waste ³		168 357	12	145 994	11	143 124	11	457 498	11
Garden Refuse ⁴		43 092	3	35 666	3	46 476	4	125 240	3
Builders Rubble⁵		100 330	7	76 399	6	99 718	8	276 460	7
Mixed Loads ⁶		16 707	1	17 549	1	19 245	2	53 503	1
Sand & Cover Material ⁷		482 135	33	434 464	32	354 558	28	1 271 223	31
Tyres ⁸		1 553	0	1 600	0	1 065	0	4 218	0
Light Type Refuse ⁹		326	0	653	0	1 501	0	2 480	0
Business Waste.		28 994	2	12 194	1	8 910	1	50 101	1
Purchase Cover Material ¹⁰		8 795	1	50 189	4	11 810	1	70 798	2
Recyclables ¹¹		0	0	13	0	0	0	13	0
	TOTAL	1 444 283	100	1 340 583	100	1 272 452	100	4 057 518	100

2 - Domestic Solid Waste, including commercial and industrial waste (non-hazardous) collected by municipal subcontractors.

- 3 Domestic Solid Waste collected by private contractors
- 4 Discarded plant/tree trimmings, grass cuttings, tree branches and trunks
- 10 Cover material purchased by DSW for use on the landfill

11 - Loads of sorted recyclable material. This 13 tons of recyclable was diverted to the public drop off recycling station located within Mariannhill Landfill.





- Additional primary data from the landfill is required preferably going back a number of years (a BASELINE) and also going forward to compare spikes that occur post disaster ... <u>but for how long after the disaster..</u>.
- Consider a policy for demolition waste apply waste hierarchy, reuse, recycle...
- Uprooted vegetation should be <u>replanted</u> where possible and feasible, esp those <u>indigenous plants that are resilient</u> to being disturbed and are endemic.
- Impact from illegal dumping informal trades waste on stormwater?



CONCLUSION

- This paper explores issues related to extreme weather (9th October 2017) on SWM.
- <u>Communities generally traumatised</u> and more concerned with recovery.
- Disaster Solid Waste can be minimised if there is <u>enforcement of building</u> regulations and <u>regular maintenance</u> of storm water systems (<u>cross-cutting</u> <u>responsibilities and functions</u> as provided in the disaster management framework and act).
- <u>Illegal dumping</u>, formal traders versus informal traders & storm water blockages.
- Bulk of Solid Waste (construction and demolition waste and wood) is likely to be suitable for recycling, treatment and composting.
- Contaminated recyclables (high calorific values) could be diverted for energy recovery where capacity available.
- Solid waste management is an important element of disaster management including facilitating access for emergency services to affected areas.





- <u>Further investigate</u> how different of wastes (especially construction and demolition, garden, and household waste) to landfill change with extreme weather events (i.e. wind or rain related over a period of ~5 years) - TIME LAGS...
- Compare data from other municipalities (AVAILIABLE LANDFILL DATA...)
- Additional recommendations for parks and gardens in managing uprooted vegetation, since a planting scheme based on indigenous vegetation is already the basis for leisure areas...REPLANTING?



Thank you for your attention

Any questions



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