



Climatic Benefits from Dumpsite and Landfill Closures with Improved Integrated Waste Management Plan

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Tel Aviv, Israel

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ISWA
Chair of the Task Force
on Closing Dumpsites



OUTLINE

- OPEN DUMPSITE: ISSUES & PAST SLOPE FAILURES
- ISWA'S TASK FORCE ON CLOSING DUMPSITES
- CASE STUDY: HIRIYA LANDFILL CLOSURE & REHABILITATION
- CASE STUDY: ISWA-CCAC DUMPSITE CLOSURE PROJECT
- GET INVOLVED WITH ISWA'S TFCD
- FINAL REMARKS

Open Dumpsites



What is an Open Dumpsite?

- Wastes widely spread, uncovered
- No daily cover
- Open fires, waste periodically on fire
- Vectors (dogs, birds, other animals) often present
- Animals seeking food at open dumps
- No liner system or CLAY soil liner
- No or limited compaction
- Leachate and landfill gas not managed
- Slope failure and stability issues
- Lack of security measures, access by waste pickers



Sanitary Landfill, Brazil



Courtesy: Ciclus, 2014

Dumpsite, India

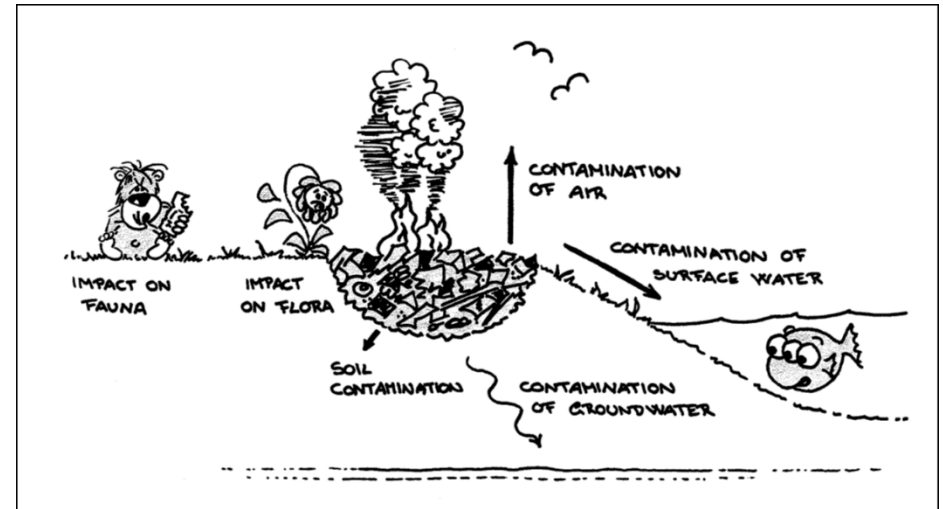


Unmanaged piling of waste



Issues with Open Dumps - Environment

- Soil, ground & surface water contamination
- Impact on Fauna and Flora
- Air pollution, black carbon from burning
- Climate impacts from black smoke and methane



Fire Hazard on Dumpsite – 30 march 2022



2019, Ghazipur Landfill



Firefighters struggled to contain the blaze at the Ghazipur landfill in New Delhi, India.

By Esha Mitra and Rhea Mogul, CNN

Updated 2:51 AM EDT, Wed March 30, 2022

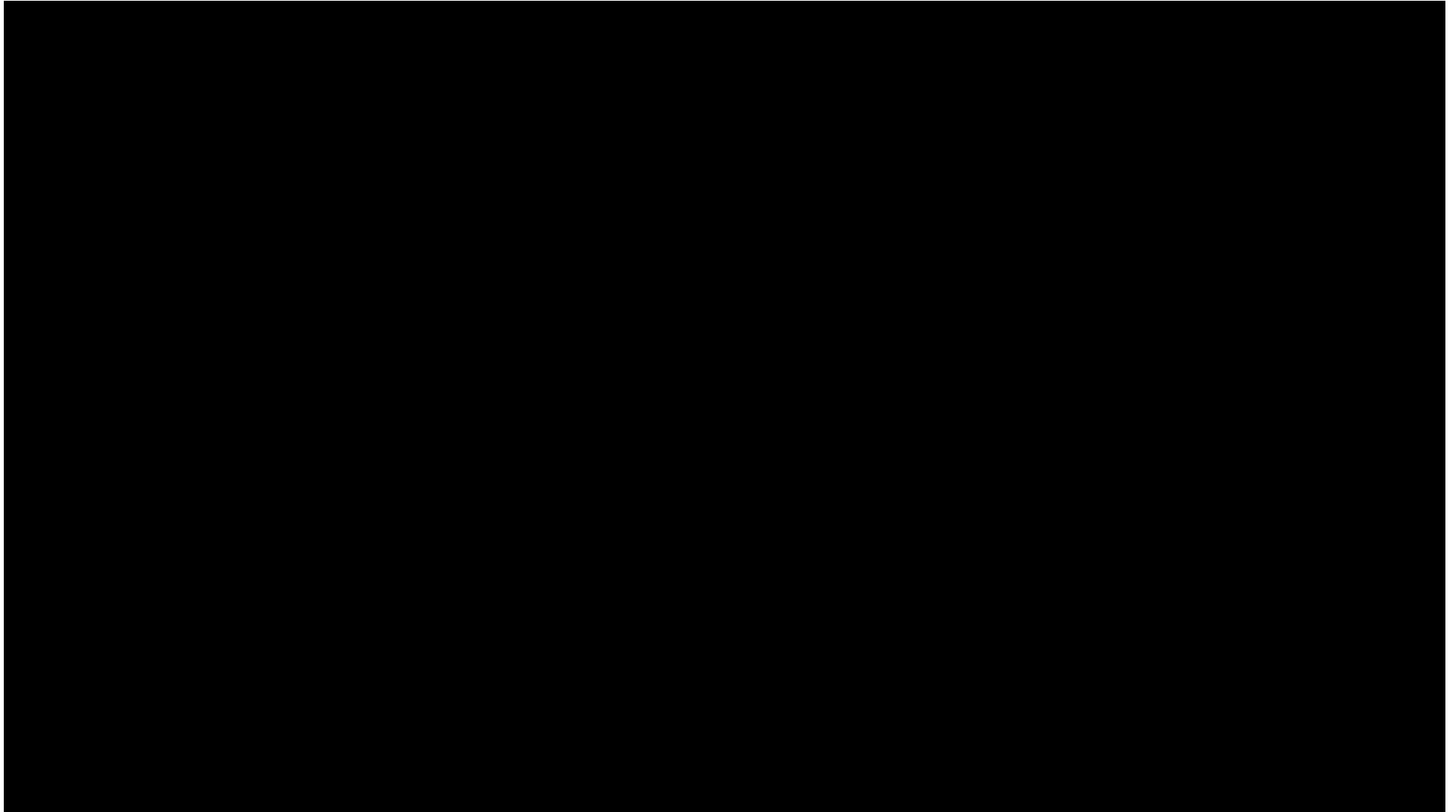


Impacts of Open Dumps - Public Health

- Contamination of drinking water
- Pests and spread of disease
- Health & safety issues of waste pickers at the site
- [ISWA video on dumpsites...](#)



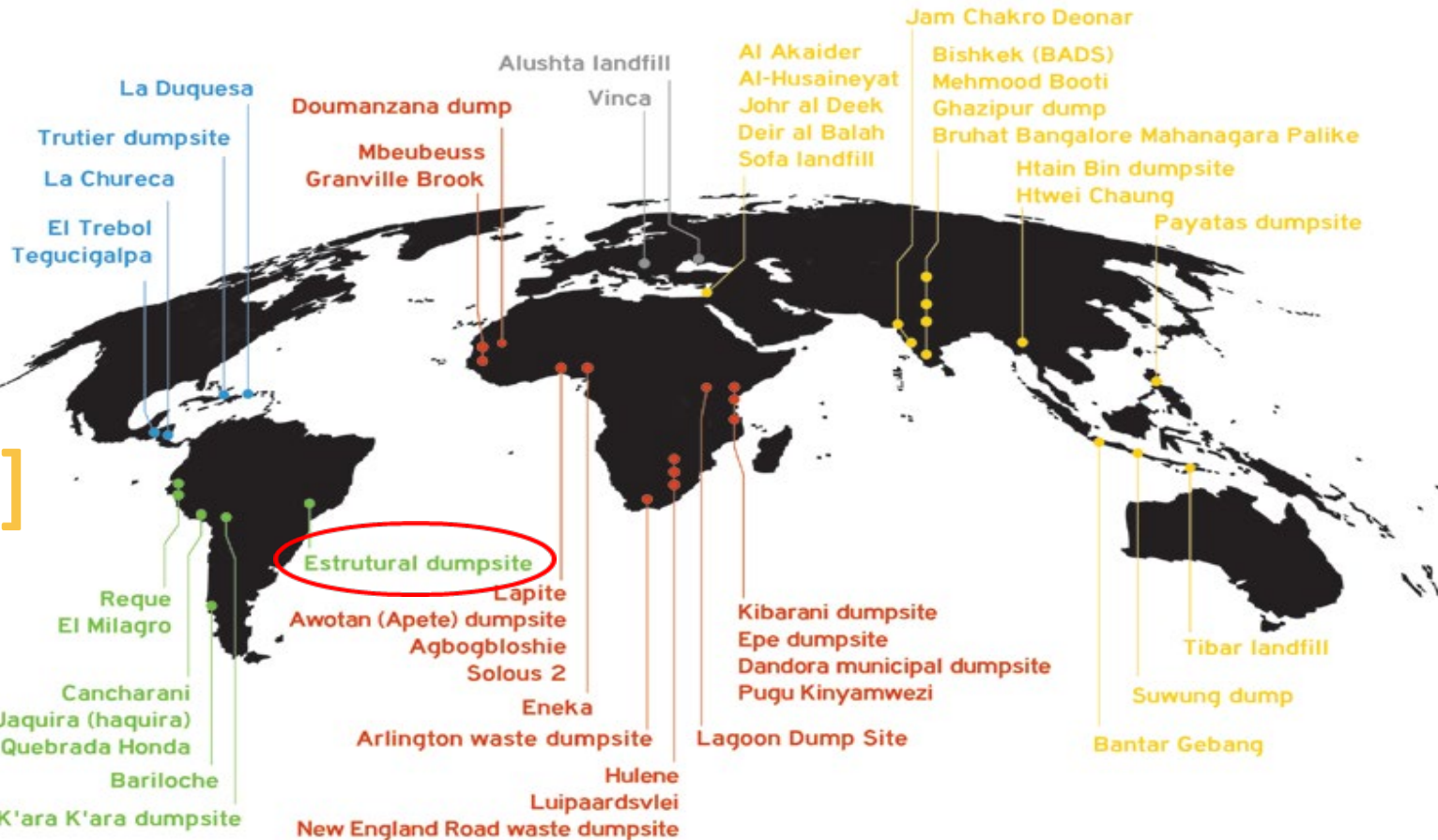
ISWA Video...




50 Largest and Dangerous Dumpsites

Globally, >50,000 dumpsites, over 2 million people working on dumpsites, 750 people killed in first half of 2016

Open Dumpsites: A Global Problem



[ 40% OF THE WORLD'S WASTE GOES TO DUMPSITES, SERVING ABOUT 3-4 BILLION PEOPLE.]

Population Growth & Waste Generation by 2050

World Population Projections by the World Bank, What a Waste 2.0 (2018, 2021)

Year	World Population	Yearly Change
2021	7,874,965,825	1.03 %
2022	7,953,952,567	1.00 %
2023	8,031,800,429	0.98 %
2050	10,200,000,000	30% in 30 years

Waste generation?

- 2.24B Mtonnes in 2020 to about 3.88B Mtonnes by 2050 (73% increase)
- Most in Latin America, Sub-Saharan Africa, South Asia

Climate change: without action, dumpsites will account for



10% of GHG (Greenhouse Gas) emissions by 2025.

It's easy to open a dumpsite...



Natural Resources and Environment Board Sarawak, Malaysia – The Study on Integrated Solid Waste Management in Sarawak (2018)

Past Dumpsite Failures

- 2000 – Payatas Dumpsite, Manilla, Philippines
 - ✓ 218 killed
- 2005 – Leuwigajah Dumpsite, Bandung, Indonesia
 - ✓ 143 killed, buried 71 houses
- 2015 – Hongao C&D Landfill, Shenzen, China
 - ✓ 73 killed
- 2016 - Hrybovychi Landfill, Lviv, Ukraine
 - ✓ 3 firemen & 1 ecologist buried
- 2017 - Koshe Dump, Addis Ababa, Ethiopia
 - ✓ 113 killed
- 2017 – Meethotamulla Garbage Dump, Sri Lanka
 - ✓ 19 killed
- 2017 – Ghazipur Landfill, East Dehli, India
 - ✓ 2 killed, half dozen injured
- 2017 – Greentree Landfill, Kersey, PA, USA
 - ✓ 1 operator killed, 4 others escaped
- 2020 - Ermua Landfill, Zaldibar, Spain
 - ✓ 2 killed



Slope Failure – China

Shenzhen, China, Dec. 21, 2015



- Landslide from a C&D Hongao Landfill
- Slide blanketed 38 ha into an industrial park; 10 m thickness ; 33 buildings buried or damaged
- Over 90 people missing or confirmed deaths
- Government agency declares failure due to breach of safety rules



Source: BBC News, 2015

ISWA'S Working Group On Landfill (WGL)

- Task Force on Closing Dumpsites (TFCD) was officially launched and executed by the WGL in 2018 as a “Global Initiative” under the leadership of ISWA Ex-President, Antonis Mavropoulos and supported by ISWA Declaration with 1,572 signatories from 96 countries
- **OUR VISION – To close all dumpsites and to transition landfilling disposal facilities toward engineered sanitary landfills along with other practical, affordable, integrated and sustainable waste management systems worldwide**



Task Force on Closing Dumpsites (TFCD):

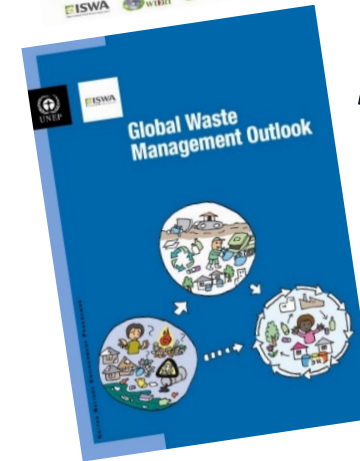
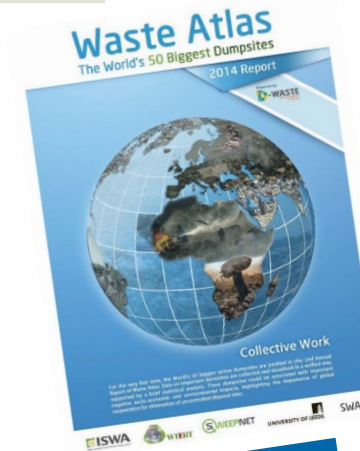
Actions:

- ✓ To initiate a global movement in closing some of the world's 50 biggest & dangerous dumpsites
- ✓ To persuade international stakeholders and decision makers to increase their investments in waste management, especially in low and low-middle income economy countries
- ✓ To engage, encourage, recognize and challenge waste professionals, organizations, and companies worldwide in getting involved with this initiative
- ✓ To provide technical guidance on how to close a dumpsite properly



ISWA's Dumpsite Publications

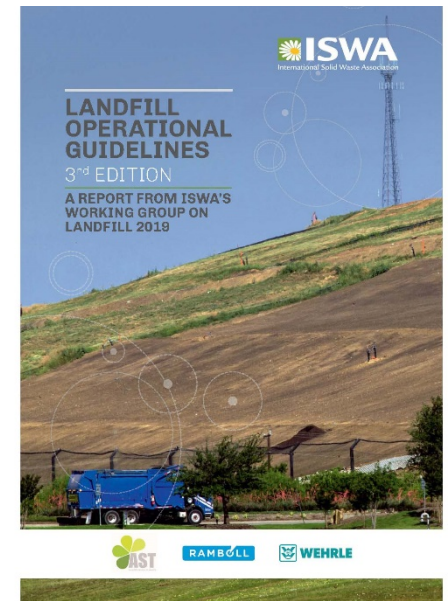
- 2014 - Mapped “Waste Atlas – the World’s 50 biggest dumpsites”
- 2015 - Released the “Wasted Health – the Tragic Case of Dumpsites” and “Global Waste Management Outlook” (GWMO)
 - First was dedicated to health impacts that are created by dumpsites
 - Second was focusing on how developing countries can advance their systems and close their dumpsites
- 2016 - Released “A Roadmap for Closing Waste Dumpsites - the World’s Most Polluted Places”



Recent WGL/TFCD Publications

- 2019 - Released two reports:
 - 1) Climate Benefits Due to Dumpsite Closure: Three Case Studies
 - 2) Landfill Operational Guidelines 3rd Edition
- 2020 - Estimation of Waste Sector Greenhouse Gas Emissions in Tyre Caza, Lebanon, Using SWEET Model (UN-CCAC & US-EPA GMI)

Find out more at:
www.ClosingDumpsites.iswa.org



Closing Dumpsites Around the World...

- Why it is relevant to us?
 - ✓ Protect the environment, air, water, soil
 - ✓ Reduce plastic waste to water bodies/oceans; marine litter – Remember that **waste is without border!**
- How can we help?
 - ✓ Our knowledge and technical regulatory experience
 - ✓ Education and training, networking with experts in those fastest growing, low income economy countries





**CASE STUDY:
HIRIYA LANDFILL CLOSURE
AND REHABILITATION –
CLIMATIC BENEFITS**

Waste Management Data for Hiriya Landfill

- Historical waste data – Provided by Dan Region Association of Towns, Sanitation & Solid Waste Disposal:
 - ✓ Waste disposal from 1952 to 1998
 - ✓ About 3000 tons per day
 - ✓ Waste composition (food waste, paper, plastic=80-90%)
- A new Material Recovery Facility (MRF) and RDF Plant by 2020, and the first waste-to-energy facility by 2026 or 2027



Hiriya Landfill closing Project

Four Scenarios in Gas Emissions Estimation:

1. Baseline Scenario: **No Action** or Business as Usual
2. Mitigation Scenario: Dumpsite **Closure** & LFG Collection System by 2005
3. Increased Compositing and Recycling 2018 (**Current Status** with Recycling 1.2%; composting 16.4%). About 50% of MSW still diverting to sanitary landfill
4. Increased Composting and Recycling 2030 - Increase recycling 29.4% and composting 16.5%. Implement improvements in waste management

Danny Sternberg – Stood by a LFG well



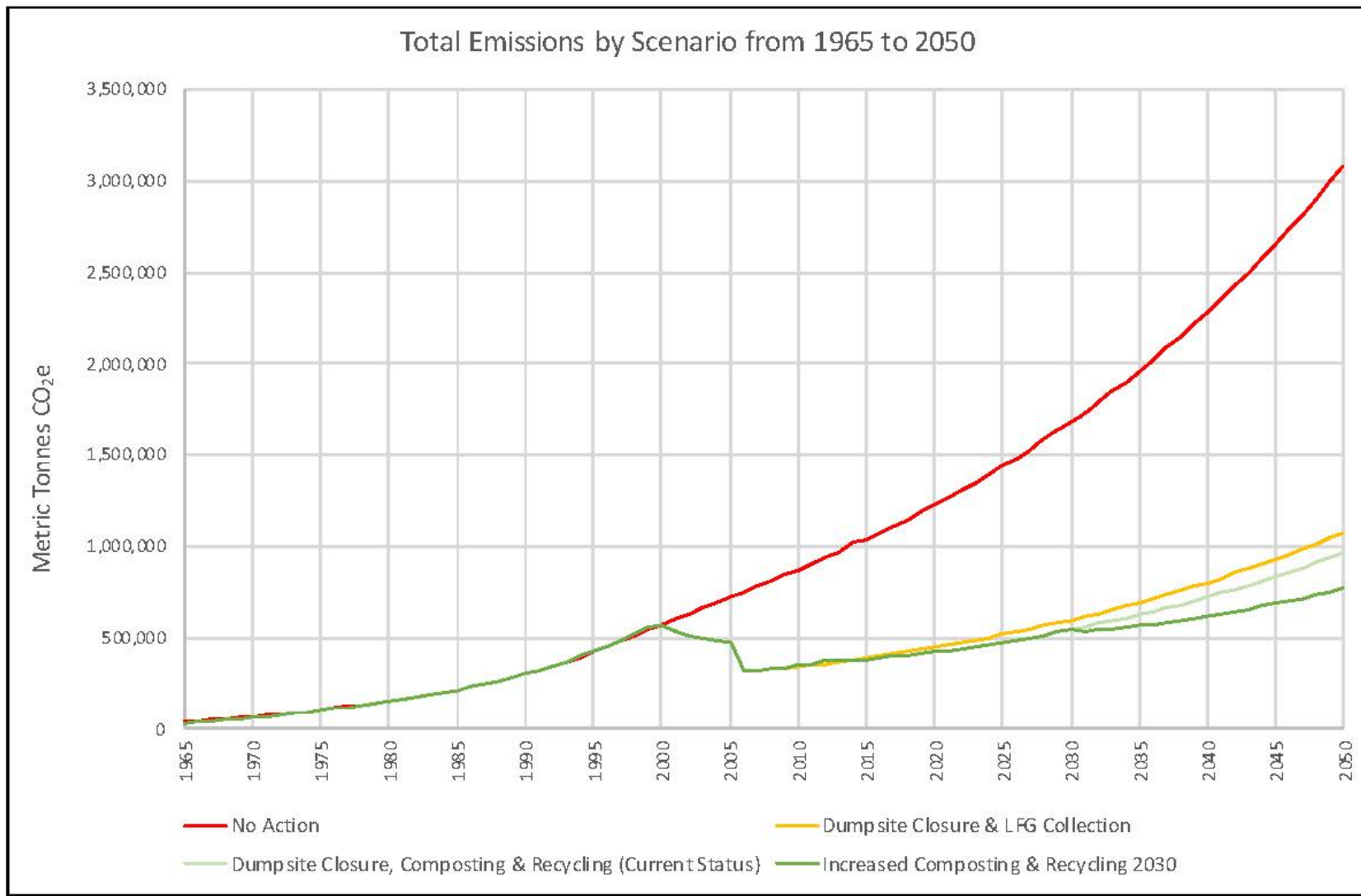


Figure 6.4 Total GWP of MSW management in the Tel Aviv metropolitan area by scenario from 1965 to 2050

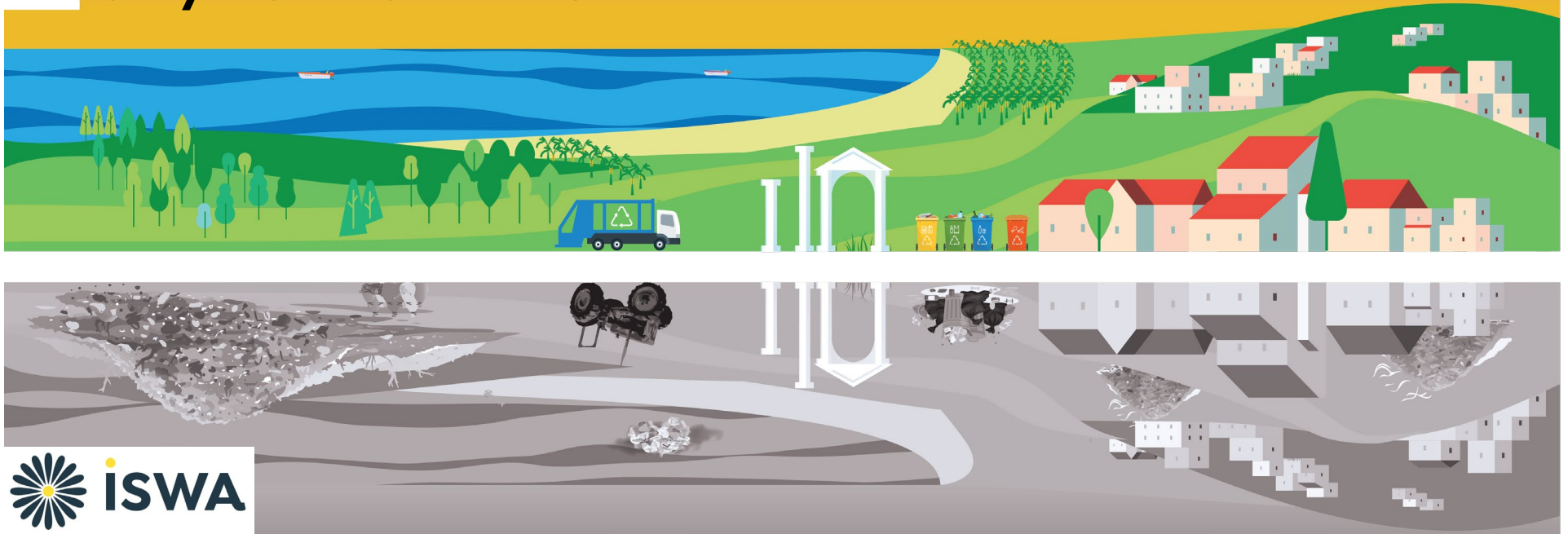
Climatic Benefits

- A large GHG emissions reduction is achievable and hence realizing climatic benefits, by closing dumpsite and mitigating landfill gas collection system
- Additional GHG emissions reduction is realized by improving recycling and composting rates of current regional waste management plan at Current Status (2018) and in 2030



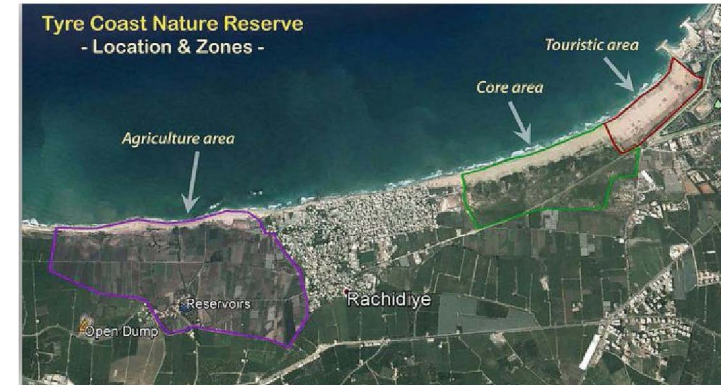
Case Study: ISWA-CCAC Lebanon Project Gas Emission Reduction Estimation July 2019-June 2021

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ISWA-CCAC Closing Dumpsite Project

- ISWA partners with UN-CCAC for the 1st time on climate benefits of closing dumpsites, using a model called Solid Waste Emissions Estimation Tool (SWEET) for a project in Tyre Caza, Lebanon
- SWEET v3.1 (2020) was developed by US EPA for UN-CCAC Waste Initiative. Free download at:
 - ❑ <http://www.waste.ccacoalition.org/document/solid-waste-emissions-estimation-tool-sweet>
- SWEET v4.0 (2021) – latest model at US EPA GMI site:
 - ❑ www.globalmethane.org/sweet
- This project showcases gas emissions quantification of a baseline + four alternative waste management systems for climate benefits comparison, leading to a decision to implement current Integrated WM Plan



Waste Management Data for Tyre

- Historical waste data on Tyre Caza – Obtained from [Lebanon's Office of the Minister of State for Administrative Reform \(OMSAR\)](#):
 - ✓ Waste composition (food waste, paper, plastic=93%)
 - ✓ Information on the Ras El-Ain Dump
 - ✓ Current and projected annual rates of waste generation, collection, disposal, and diversion
 - ✓ OMSAR/EU reports: [IWMP](#), Dumpsite Closure Report, Evaluation of Ain Baal Waste Treatment Facility
- Many reports and journal articles following WM crisis in 2015

Trash fills the riverbanks of Beirut, Lebanon during the waste disposal crisis in 2015



Photo from Antonis Mavropoulos, "Lebanon Waste Crisis: how it all started?" Wasteless Future. 12 January 2017

ISWA-CCAC Closing Dumpsite Project

Five Scenarios in Gas Emissions Estimation:

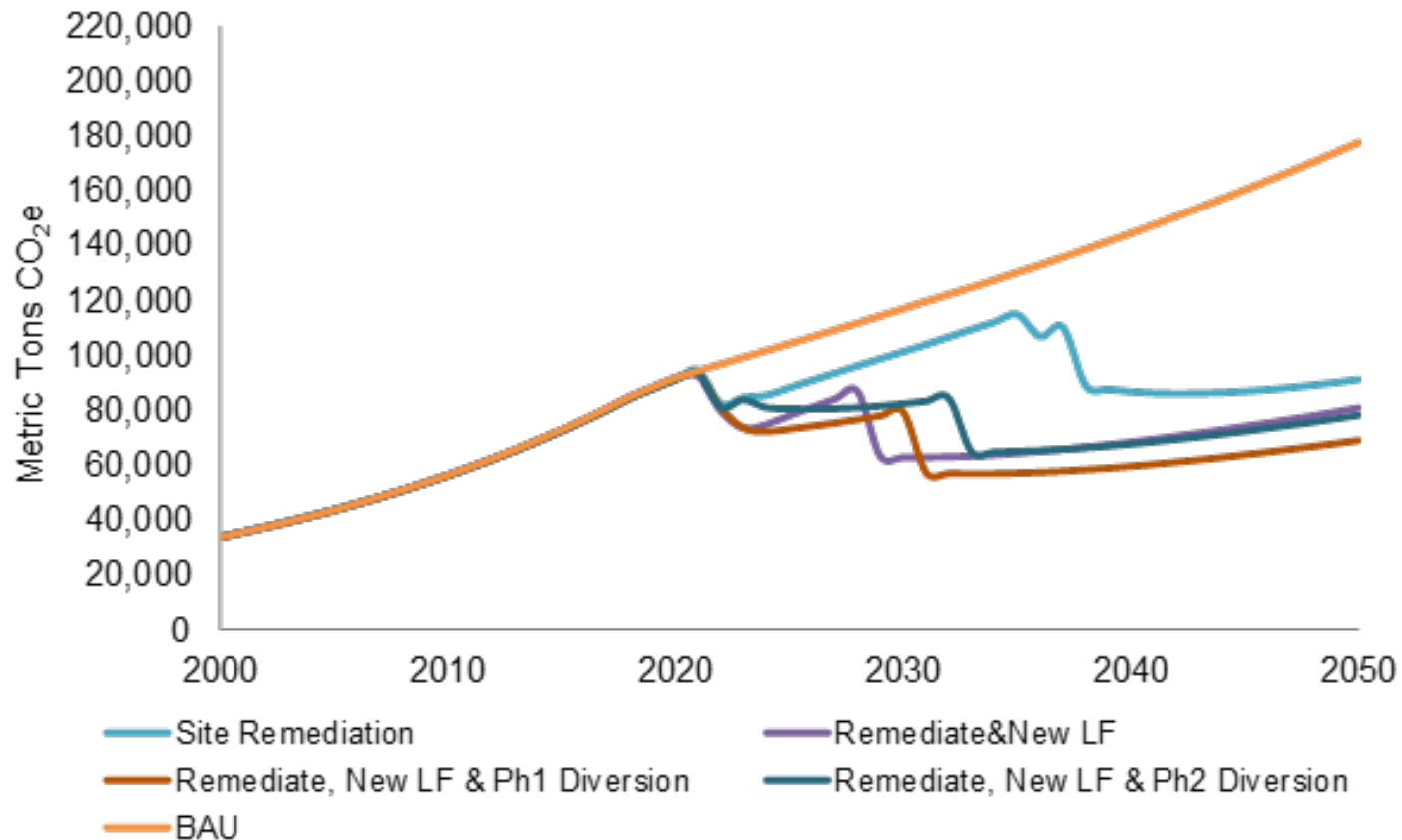
1. BAU: Baseline Scenario, Business as Usual
2. Alt S1: Remediate Dumpsite (2022-2025)
3. Alt S2: Remediate Dumpsite and Develop new Landfill (2023)
4. Alt S3: Remediate Dumpsite, Develop new Landfill, and Implement **Phase 1 Diversion to 40%**, involving local government actions & policies to revise and improve current collection, recycling, & operation systems (2023-2025)
5. Alt S4: Remediate Dumpsite, Develop new Landfill, and Implement **Phase 2 Diversion to 52%**, involving national policies on utilization of RDF (2023-2025)

Closed Ras El-Ain Dumpsite near Tyre, Lebanon



Photo: Karim Hashash, Office of the Minister of State for Administrative Reform (OMSAR) in Lebanon

Total GHG and Black Carbon (SLCPs) Emissions



Total Emissions Reduction in Percent, % (% of Baseline Scenario Emissions)

Year	Alternative Scenario 1	Alternative Scenario 2	Alternative Scenario 3	Alternative Scenario 4
2025	15%	25%	30%	22%
2030	13%	46%	32%	29%
2035	11%	51%	56%	50%
2040	40%	53%	59%	53%
2045	46%	54%	60%	55%
2050	48%	55%	61%	56%

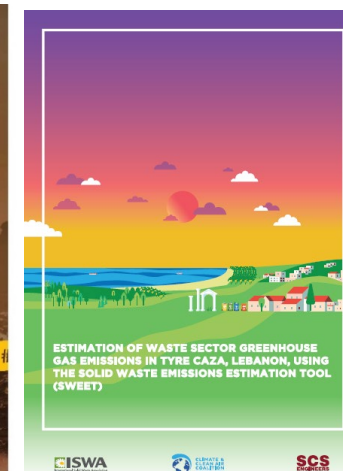
Alt. S3 diversion scenario yields most emissions reduction, from 30% in 2025 to 61% in 2050

Closure Project Findings & Conclusion

- A large GHG emissions reduction is achievable, by closing and remediating dumpsites, starting a new LF and improving current waste management plan on recycling
- Each projects serves as an excellent showcase on climate benefits of closing the dumpsite and creating a replicable template for other projects.
- The report produced is critical in supporting future funding application to organizations such as The World Bank



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Today we are asking you to change the course of a nation



ISWA's Next Step on TFCD

- Create partnerships with NMs, governments, municipalities
- Promote transitioning from dumpsites to sanitary landfills
 - ✓ Implement an integrated waste management plan
 - ✓ Ensure closure is supported by a system of infrastructure and have more sustainable alternatives in place, e.g. the Hiriya/Ayalon Park
 - ✓ Provide social support and employment for the people living on the dumpsites (informal recyclers)
- Support ISWA Winter School at UTA Landfill Operations and Management Training program
 - ✓ Over 5 years, over 200 participants from 80+ countries
- Create of a free online Helpdesk for inquiries
- Create a Global Dumpsites Observatory that will monitor the progress achieved through global partnerships

Task Force on Closing Dumpsites

- This is a **long-term** initiative that will take a lot of resources, time and effort to deliver results
- It requires **partnerships with our NMs**, networks, recognition, awareness and attraction of **new members** in supporting the activities of TFCD
- Do **one project at a time** to tell a success story!



In closing remarks, closing dumpsites is all about protecting....

Environment



Health



Climate



#CLOSINGDUMPSITES

#CLOSINGDUMPSITES

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Thank You

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See you in Singapore – ISWA WC 2022

- ISWA's Singaporean National Member invites you to Singapore, 21-23 September 2022



Don't Waste Our Future

Location: Marina Bay Sands Expo and Convention Centre, Singapore

In recent years, sustainability is all about going "circular". Across all industries, big or small, businesses are adopting sustainability strategy to stay competitive, but weaving our economic system into one harmonious, never-ending bundle of reduce, reuse and recover is no easy task. And in this endemic situation, as we reopen borders and economies, **“don't waste our future”** is a perfect opportunity and platform for business leaders and entrepreneurs, technology developers, solutions providers as well as policy makers to gather and discuss.