Waste management – still a global challenge in the 21st century: An evidence-based call for action



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The Global Waste Management Outlook

What is the status of waste management around the world? Why should waste management be seen as a global issue and a political priority? What novel insights could we obtain by sketching for the very first time the big, global picture? Has any progress been achieved? Are the current narratives and established beliefs in line with the evidence? Given the vast differences in waste management realities between the Global North and the Global South, are there common global challenges, or do the varying levels of socioeconomic development necessitate essentially two parallel approaches?

We had the opportunity to address these and other difficult questions as part of an international team, from North and South, which spent 2 years preparing the first comprehensive global overview of the state of waste management around the world in the 21st century (United Nations Environment Programme and International Solid Waste Association, 2015). Following the Rio+20 Sustainable Development Summit in 2012, the United Nations Environment Programme's (UNEP's) Governing Council requested UNEP:

'to develop a global outlook of challenges, trends and policies in relation to waste prevention, minimization and management ... to provide guidance for national policy planning'.

What could be the scope and focal point of such an outlook? Indeed, waste management is a key utility service and a critical element of the infrastructure that underpins Society – it is often rated in the top three priorities faced by developing country cities. Yet it tends also to be 'taken for granted' and does not often appear towards the top of national or international political agendas. Effective technologies required to 'solve' the waste problem are largely already available, and have been much written about. The Global Waste Management Outlook (GWMO) has chosen rather to focus primarily on the less fashionable 'governance' issues that need to be addressed to establish a sustainable solution – including the regulatory and other policy instruments, the partnerships and, crucially, the financing arrangements – and to provide a 'toolkit' to be used in developing a solution appropriate to the local situation.

The GWMO (United Nations Environment Programme and International Solid Waste Association, 2015) was prepared for UNEP's International Environmental Technology Centre and the International Solid Waste Association (ISWA). It underwent broad international multiple-stage peer review, involving around 100 reviewers, and was launched at the ISWA World Congress in Antwerp on 7 September 2015. The GWMO is an important and timely status report; and, most importantly, an evidence-based call to action for the international community. It sets out five *Global Waste Management Goals*: Making progress toward these would help to achieve more than half of the new *United Nations Sustainable Development Goals* (SDGs). And also a 10-point *Global Call to Action* to achieve these goals.

Key findings

How much waste is generated around the World? In trying to answer this apparently simple question, the GWMO team rapidly identified one of their key conclusions and recommendations: That availability and reliability of waste and resource data is dire, and urgently needs attention. The GWMO's best estimate of total solid waste in 2010 (the latest available reference year), from households, commerce, industry and construction, is 7 to 10 billion (109) tonnes. Of this, around 2 billion tonnes is municipal solid waste (MSW), for which municipal governments have taken responsibility. Around half of each of these totals is generated in the longstanding high-income developed countries (Western Europe, US, Canada, Japan, Australia, New Zealand), but that proportion is set to decline over the coming decades as waste generation elsewhere grows, with significant increases anticipated first in Asia and then in Africa. Many cities in lower income countries in Africa and Asia are set to double their MSW generation within 15–20 years, as a result of growing populations, continued migration from rural to urban areas and the apparently inevitable rise in waste per capita as their economies develop. At the same time, globalisation is resulting in a shift in production, and thus in industrial and hazardous waste generation, from developed to developing countries.

What would the costs be to Society if wastes are not managed properly (the so-called 'costs of inaction')? The public health and environmental damage costs of uncollected waste, uncontrolled disposal, open burning and unsound resource recovery include additional health care costs, lost productivity, flood damage, damage to businesses and tourism and longer-term clean-up costs. Measuring these 'intangible' costs is notoriously difficult, but the evidence collected together for the GWMO suggests that the economic costs to society of inaction are 5–10 times greater than the financial costs of proper waste management.

Some developing countries have made significant progress over recent decades, but both collection coverage and controlled disposal rates in the poorest countries remain at low levels. The GWMO estimates that around 2 billion people worldwide still lack access to regular waste collection; while a larger number, around 3 billion, lack access to controlled disposal services for MSWs. This reality is a global public health and environmental imperative requiring a co-ordinated approach, rather than just a national or local problem. Without concerted international action, the situation is likely to get worse rather than better, as urban populations and waste quantities grow in the poorest countries.

So the first two *Global Waste Management Goals* are: (1) to ensure, by 2020, access for all to adequate, safe and affordable solid waste collection services; and (2) to stop uncontrolled dumping and open burning. Goal (3) takes this one step further, by 2030 to achieve sustainable and environmentally sound management of all wastes, particularly hazardous wastes. As part of the *Global Call for Action*, the GWMO is calling on the international community to mobilise international aid, and environmental and climate funds, to assist the poorest countries to provide basic waste services to all in urban areas. Specifically, to increase the level of funding on waste management by a factor of 10, from the 0.3% achieved over the last decade (Lerpiniere et al., 2014) to an average of 3% of total international aid funding in the period from 2015 to 2030.

In the modern era, waste collection as a municipal utility service dates back to the middle of the 19th century, whereas controlled disposal came firmly onto the agenda only in the 1960s. The developed countries have moved in steps, working first in the 1970s and 1980s to eliminate uncontrolled disposal and open burning, and then to ensure the environmentally sound management of all wastes, including hazardous wastes. More recently, MSW recycling rates (defined as a percentage of material collected for recycling) have been driven up by concerted policy actions, for example, UK rates increased from just 6% wt. in 1997 to around 46% wt. in 2014. Waste generation per capita, which had doubled between 1970 and 2000, has now begun to stabilise. Again, despite this encouraging progress, the GWMO has found that there is much still to be done across the world in making the transition from 'end-of pipe' waste management in a linear economy, to integrated and sustainable resource and waste management in a circular economy. The remaining Global Waste Management Goals focus: (4) on ensuring by 2030 a substantial reduction in waste generation through prevention and the 3Rs (reduce, reuse, recycle), thereby creating green jobs; and more specifically, (5) cutting by a half, per capita global food waste at the retail and consumer levels, and reducing food losses in the supply chain. The last three points in the Global Call to Action address these goals and thus apply to all countries, not just developing ones.

A major focus of the GWMO has been on financial sustainability. At a societal level, proper waste management makes sound economic sense. But, it still has a financial cost that needs to be met. Among the key findings here, affordability is a major challenge in developing countries (although in these times of austerity, it may again become a challenge more widely); full cost recovery from householders is more affordable as income levels rise; whereas, even the poorest will pay something when they can see the benefits of a clean and healthy community. Raising finance for investment in modern waste and resource management facilities is still a major challenge, and the GWMO confirms that this is generally the case all around the world, even in the most developed countries.

Benefits of sound waste management

Waste management is a cross-cutting issue impacting on many aspects of society and the economy. It has strong linkages to a range of other global challenges, such as health, climate change, poverty reduction, food and resource security, and sustainable production and consumption. The five *Global Waste Management Goals* set out in the GWMO are all to be found within the 2030 Agenda for Sustainable Development (agreed by the world's leaders in New York just a couple of weeks after the launch of the GWMO), but making progress toward them would contribute to achieving 11 out of 17 SDGs.

The link between waste and climate is particularly important. Waste management is generally considered a small but important contributor to global greenhouse gas (GHG) emissions. Its direct contribution through methane (CH₄) emissions from anaerobic decomposition of organic wastes at disposal sites was estimated by the Intergovernmental Panel on Climate Change (IPCC) at around 3% of total GHG emissions in 2010. However, this figure grossly underestimates the potential contribution of improved waste and resource management to GHG mitigation: Planet-wide MSW generation in 2010 was dominated by high-income countries, which had already substantially reduced methane emissions from land-fills. For example, changes in Germany's waste sector between 1990 and 2006 reduced the country's total GHG emissions by 5% (Dehoust et al., 2013), and this was in addition to the significant mitigation of methane emissions already achieved prior to 1990.

The IPCC estimate also omits those emissions displaced through waste prevention, reuse, recycling and biogenic energy recovery as these occur outside of the 'waste sector'. Using a life cycle approach, it has been estimated that a 10%-15% reduction in global GHG emissions could be achieved through improved solid waste management, including landfill mitigation and diversion, energy from waste and recycling (Dehoust et al., 2013). Including waste prevention could further increase this estimate. An on-going United Nations project estimates that 1.3 billion tonnes of edible food waste is generated every year (Food and Agriculture Organization of the United Nations, 2015), representing one-third of all food produced for human consumption. Prevention of this food waste would reduce total global GHG emissions by an amazing 9%: More than the total emissions of any country other than the US and China. The GWMO concludes that the potential impact of improved waste and resource management on reducing GHG emissions across a broad range of economic sectors could be 15%-20%.

The 3Rs represent a major economic opportunity to society. Making less that goes to waste saves business money: On raw material, energy and labour costs. The estimated savings to business worldwide resulting from waste reduction is hundreds of billion USD per year. Developing countries often achieve good recycling rates through the informal sector – building on that foundation, while eliminating child labour and hazardous/polluting working practices, offers an opportunity to cut the investment needed in sound treatment and disposal facilities. The GWMO highlights a number of 'waste to wealth' projects across Africa, which have demonstrated how new waste services can be used as a catalyst for sustainable livelihoods and economic development in poor neighbourhoods of some of the world's poorest cities.

Research needs

The GMWO represents an important step in putting waste management on the mainstream political agenda, rather than an end in itself. Recommendations for follow-up work have been collated under four headings: The coverage of a series of planned *Regional Waste Management Outlooks*; improving data; preparing guidance on implementing some of the actions; and research to fill some of the evidence gaps. Those on improving data and the evidence gaps are likely to be of particular interest to the academic research community.

A key recommendation is that waste and resource management data are actively included within wider international action as part of the Data Revolution to improve data for sustainable development. ISWA and UNEP are urged to develop, by 2018, globally recognised and internationally agreed methodology and protocols for collecting waste data at a national and city level. The newly available performance indicators for waste management in cities (one example being the Wasteaware benchmark indicators (Wilson et al., 2015), which won both the 2015 ISWA Publication Award and CIWM's James Jackson Award) should be applied widely, and then updated and further standardised to facilitate benchmarking and monitoring progress over time. Attention is also drawn to the need for waste prevention metrics and for research on forecasting future rates of MSW generation per capita, with a view to institutionalising their regular publication and updating, in the same way that the UN currently publishes regular forecasts of world population and urbanisation prospects.

General evidence gaps include the dissipation of value when materials and products at their end-of-life become waste; economics of waste and decoupling; evidence linking waste and health; waste and climate change; and on the costs of inaction. Specific recommendations are given on developing more effective approaches to international development financing for solid waste management, to open up faster, better funded and more flexible credit lines, which recognise the need to deliver rapid improvements to waste management systems on the ground; and on compiling the evidence base for successful financing of waste management and resource recovery infrastructure, identifying good practices and developing good practice recommendations, aimed at both developed and developing countries. Two further areas of focus are research on how to achieve behaviour change; and more effective approaches for the producers of products and other stakeholders in the supply chain to take more responsibility for waste management associated with their prod-

The GWMO comes down firmly that waste management is still a global challenge in the 21st century, both South and North; we all need to work together to achieve real and sustainable progress. *Waste Management & Research* will be pleased to receive future contributions addressing, in particular, the data and evidence gaps identified here.

ucts and wastes in developing countries.

Disclaimer

The views expressed here are those of the authors and not necessarily those of UNEP or ISWA.

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