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FROM THE EDITOR'S DESK

The research article on "Comparing Solid Waste Management in the World's Cities" by Ljiljana Rodic, Wageningen University, Wageningen, Netherlands, Anne Scheinberg, WASTE, Gouda, Netherlands paper.David C. Wilson, Imperial College, London, UK is a pioneering work giving the real insight in SWM. The authors have to be congratulated for obtaining the data for their research from various cities of the world and presenting them in an orderly standardized understandable format for the reader.

In producing a book containing more complete information than the above article, the authors have utilized their combined experiences accrued over the past 40 years. Case studies from 20 cities on six continents provide up-to-date and comparable data that are used to inform investigation into the topics of waste policy, technology, good and bad practice, management, financing, and governance, with the focus on processes and sustainability. The authors have developed a new standard method for data collection and analysis using the concept of Process Flow Diagram in this much diversified complex area in order to cover comprehensively covers all aspects of SWM.

The authors have pointed out the most important fact that there is no one right answer that can be applied to all cities and all situations, thus challenging the notion that a city in a developing country striving to improve its waste services can simply copy a working system from a particular city in a developed country.

In conclusion the editor wants to state that the authors of the research article have done a very valuable service to the SWM Community.

Everyone who is working in SWM should read the full article and the book which will help immensely to understand the complexity of SWM.

Comparing Solid Waste Management in the World's Cities

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Comparing Solid Waste Management in the World's Cities

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This articleis based on work carried out to prepare UN-Habitat's Third Global Report on Water and Sanitation in the World's Cities – ***'Solid Waste Management in the World's Cities'***, which was launched at the 5th World Urban Forum in Rio on the 23rd of March 2010. The bookon this topiccontaining more informationis designed to fill a gap in the literature and knowledge base regarding solid waste management in low-, middle- and high-income countries, and to provide new data with a fresh perspective. In producing this book the authors have utilized their combined experiences accrued over the past 40 years.Case studies from 20 cities on six continents provide up-to-date and comparable data that are used to inform investigation into the topics of waste policy, technology, good and bad practice, management, financing, and governance, with the focus on processes and sustainability.

This article and the book are the product of a combined effort of more than 35 professionals in solid waste from economically developing, transitional, and developed countries, many of whom are connected through the CWG (Collaborative Working Group on Solid Waste Management in Low- and Middle-Income Countries, http://www.cwgnet.net/), a global community of practice. The project was co-ordinated by WASTE, Gouda, the Netherlands, an institute-type NGO that specializes in multi-country research and development programs, which are made possible by their wide network of partners and local experts.

The book is a building block towards a new standard method for data collection and analysis, as well as an international database that rests on about 300 data points. These data points include a number of quantitative benchmarks that can be applied to cities in low-, middle- and high-income countries to produce benchmarks and derive smart indicators, as well as a complete waste mass balance presented by a process flow diagram. The data can be used to profile a city and produce both a baseline document and needs assessment for future intervention, thus allowing comparison between cities and supporting better understanding of the processes and driving forces that affect them all.

The book is based on the concept of Integrated sustainable (solid) waste management – ISWM that distinguishes three dimensions in analysis of solid waste management and recycling systems: technological components, sustainability aspects (social, institutional, political, financial, economic, environmental and technical) and stakeholders (also called actors) present at certain location.

A major constraint in comparing SWM systems in different cities is the lack of consistent global solid waste and recycling system benchmarks – not even the most common indicator, cost per ton, is available in most cities. The most basic kinds of information are collected in very different ways in different cities, ***A central tenet is that there is no one right answer that can be applied to all cities and all situations, thus challenging the notion that a city in a developing country striving to improve its waste services can simply copy a working system from a particular city in a developed country.***

Reference cities in this research

City, Country	Population	GDP per Capita (USD)	HDI
Adelaide, Australia	1,089,728	39,066	0.970
Rotterdam, Netherlands	582,949	46,750	0.964
San Francisco, USA	835,364	45,592	0.956
Tompkins County, USA	101,136	45,592	0.956
Varna, Bulgaria	313,983	5,163	0.840
Belo Horizonte, Brazil	2,452,617	6,855	0.813
Canete, Peru	48,892	3,846	0.806
Curepipe, Mauritius	83,750	5,383	0.804
Kunming, China	3,500,000	2,432	0.772
Sousse, Tunisia	173,047	3,425	0.769
Quezon City, Philippines	2,861,091	1,639	0.751
Managua, Nicaragua	1,002,882	1,022	0.699
Bengaluru, India	7,800,000	1,046	0.612
Delhi, India	13,850,507	1,046	0.612
Ghorahi, Nepal	59,156	367	0.553
Dhaka, Bangladesh	7,000,000	431	0.543
Nairobi, Kenya	4,000,000	645	0.541
Moshi, Tanzania	183,520	400	0.530
Lusaka, Zambia	1,500,000	953	0.481
Bamako, Mali	1,809,106	556	0.371
Average	2,462,386	10,610	0.717
Median	1,046,305	2036	0.760

The paper abounds in examples from the above 20 cities to illustrate comparative analysis that is possible when consistent and comparable data are available and concludes with some key messages arising from the work.The world community learnt that no technology can solve the problems related to economic and social sustainability of waste management solutions:

> if the citizens are not interested or willing or simply cannot afford to pay, the system will not be able to sustain itself over a longer period of time, regardless of access to grants and loans for capital investments from the central government or international financing agencies. 'Better' technology cannot solve this kind of problems.
>
> if the collection system in place is not in accordance with citizens' needs and preferences, if the measures are imposed then, the system will not perform as designed. The use of more advanced technology cannot resolve these kinds of issues either.
>
> A state-of-the-art landfill for disposal of Solid Waste will make only a minor contribution to the public health if the streets of the cities are still littered and heaps of uncollected waste abound.

Developing and using the methodology

The authors examined the present situation in 20 cities around the world, as a kind of 'reality check'. For each city a key person was designated – the city profiler – who works or has worked in the city and knows its situation well. This person became the liaison to the city authorities and other stakeholders who provided data and information from their own records and experiences, and was responsible for organizing the information, cross-checking it and reconciling discrepancies, as well as for specialized analysis. In order to make comparison possible among vastly different cities from all over the world, the authors prepared a detailed methodology that took several hundreds of hours of discussions to design and over 40 pages of instructions to describe. In addition a smaller presentation of roughly 15-20 pages per city was prepared that was designed to present key indicators and narratives about the waste management policies and practices in the city in a form that was accessible to readers. The authors are intending to establish a web-based database using 'survey monkey' software, where each city profiler could enter the data on his/her city online.

The City Profile

In parallel to the development of the profiling methodology, the following criteria were established for selection of the cities to be included in the project. Two sets of criteria were established and applied for city selection – one for the entire group of cities and one for individual cities. The entire group of cities is compiled with the following criteria in mind:

- Representing a range of sizes, from mega-city to small regional city;
- Representing a range of geographic, climatic, economic and political conditions;
- Mostly cities from low- and middle-income countries, with several from Africa;
- At least one city from each continent. This implied including (for the first time in a global comparison) cities from high-, middle- and low-income countries.

Individual cities are selected according to the following criteria:

- The city gives a good illustration of one or more of the main topics of the book;
- The city administration and other stakeholders are willing to participate, prepare the materials and provide information;
- The stakeholders are willing to share both good and not-so-good practices;

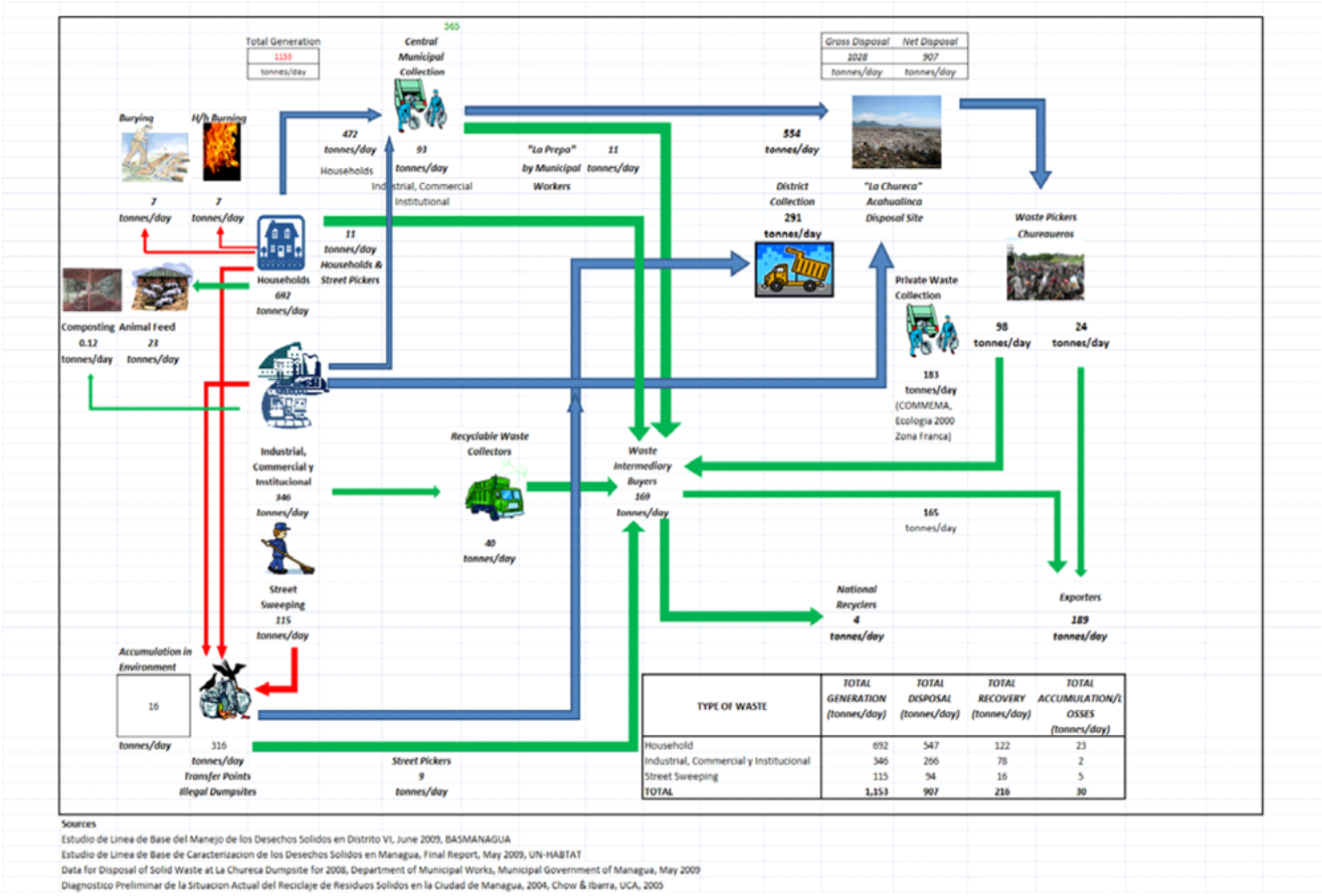
- The team includes or has access to a person or an organization that would take the role and the responsibility of working with city officials and other stakeholders, collecting the data and making the city profile.

These criteria resulted in a diverse combination of 20 cities. The cities vary in a broad range along the criteria pursued: from the Indian mega-city of Delhi that is home to over 15 million people, to the small regional center of Canete in Peru, with population around 50,000; from the city of Rotterdam as far as 52°North to Adelaide at 35°South; from a population of 4 million in Nairobi, Kenya, situated on the equator, to the small university center of Ithaca of 30,000 inhabitants in Tompkins County in New York State, North-East U.S.A. Data and responses came from countries as different as China and Mauritius, Tanzania and Philippines, Nicaragua and Bangladesh.

Presentation of results

The authors have collected original data from 20 cities, and produced comparative tables, and organized the information in text and diagrams in a highly condensed two-page summary for each city, By using the process flow diagram (PFD) the total picture of a solid waste system can be seen at a glance, showing the process steps and the movement of waste material streams between them. This implies several distinct advantages: all the waste streams are accounted for, losses are exposed, system boundaries are clearly denoted, no activities are forgotten, final destinations of waste materials are explicit, and the place and contributions of all stakeholders are visible. In addition, a PFD shows interfaces between various waste handlers in the system, thus demarcating points for possible interventions by the authorities in charge.

Process Flow Diagram – Managua, Nicaragua



The PFD enabled accurate representation of situations in which waste is officially destined and reaches the disposal site but is picked there by waste pickers and returned to the city for recycling. A table would include this amount either under disposal or under recycling. Including the amount under recycling as the final destination would result in losing the information that this waste actually first travelled to the disposal site, i.e., it received handling and transport, incurred costs and required time and organization. Trying to keep this information by including this amount under both disposal and recycling would affect the mass balance, as this amount would be calculated twice. Similar problem arises with representation of waste amounts in illegal dumps spread all over the city that are regularly being cleaned and waste transported to the official disposal site...

The selected city profile starts from the city's geographic and demographic context, and continues to describe the development of the system and its stage in the process of modernization. Then, technical components and governance issues are discussed in detail in the book. Finally, a few selected features are illuminated that constitute global good practice, priorities for Improvement are proposed, and problematic areas are identified.

Development Drivers and Modernization Stage

As the driving forces (drivers) that govern cities' policies and practices in solid waste handling are indicative of their stage of modernization, the drivers are identified that determine the current situation in the selected 20 cities. The baselinedriving force is the resource value for solid waste related activities. Society is largely resource constrained and, consequently, end-of-life products and materials have a positive value. In such a society, wastage is minimized, products are repaired and reused, organic matter returned back to the land. As cities grow, wastes accumulate in the streets and water courses, posing acute health risks, which become a major concern and a driving force in shifting the focus to waste collection. If and when environmental concerns become prominent in public and political attention in industrialized countries, environmental protection becomes another major driver for solid waste policies. This results in development and application of various engineering control measures for reduction of negative environmental impacts of waste disposal. However, these technologies are costly, therefore, once they are installed, most city policies seek to minimize the amounts that require disposal. This, in combination with growing concerns about depletion of natural resources, serve to create a renewed focus on resource management in the form of recycling, and more recently on prevention and reuse, Each city has a unique path, with its own sequence and overlap of development stages, in accordance with local characteristics and priorities. Contributing factors range from the prominence of individual governance aspects such as strong commitment of local authorities, to the presence and influence of international financing agencies... Concerted efforts are put to organize adequate waste collection services beyond the city business district, dumpsites are being upgraded to higher standards or new landfills are constructed from scratch, while at the same time material recovery policies are being actively implemented.

Waste quantities and composition

As one of the first steps in addressing waste management and recycling systems in reference cities, municipal waste is defined to include: household waste, institutional (office), commercial (shops, markets), small businesses, street cleansing and maintenance of public spaces. It should be noted, that the definition of special healthcare waste, as hospitals and other healthcare facilities e usually situated within cities are not uniform. This is important to know

when comparing amounts of waste generated in the cities. While most cities keep records for municipal waste separate from those for industrial waste, Adelaide combines information on industrial and commercial municipal waste into one stream, thus making it difficult to compare with other cities.

This research found that information on proper waste generation is seldom available – the generation data are frequently confused with what is registered or estimated as being collected by the formal waste management system, which is unlikely to capture all waste generated in the city. Poor information on waste composition and lack of documentation of existing private sector (formal and informal) recycling activities frequently result in inflated estimates of the amount of waste requiring disposal. When a city is investing in new infrastructure, this brings with it a real danger of over-capitalization – building large facilities for waste streams that are not there.

Waste Collection

Waste collection is one of the most visible urban services. Here, the main interest was in two indicators: waste collection coverage, that reflects the interests of systems users,and the availability of vehicles and equipment that is primarily important for service providers.

Coverage represents the percentage of total households served, reported separately for slum, low-, middle-, high-income city areas and total city. The, cities in high-income countries and a few former socialist countries reach a complete 100% coverage. The cities in low-income countries with GDP under 1,000 USD per capitaare still struggling to provide adequate waste collection and street sweeping services to their citizens. In their efforts they are partnering with diverse stakeholders, ranging from the private sector (which is often not interested), community based organizations (CBOs), and the informal sector and their associations, with varying success.

Waste management systems in low-income countries have often failed due to use of imported vehicles and equipment (often purchased or donated by donor-funded projects or public private partnerships, PPPs), which are costly to operate and maintain and for which spare parts and servicing facilities are not locally available. It is not uncommon that half a city's collection fleet is out of service awaiting parts. In a city with already faltering waste collection services indicate will result in illegal waste dumps around the city.

Waste Disposal

The findings regarding waste disposal in 20 reference cities encompass the entire range of possibilities - uncontrolled open dumping, controlled dumping at officially recognized dumpsites (developed over time and now used in absence of a better alternative). Some cities have upgraded their enormous dumpsites, in different contexts and for different reasons. Improvements at Payatas dumpsite of Metro Manila situated in Quezon City, Philippines, are a direct result of policies and actions taken following the collapse of Payatas in 2000, which resulted in the deaths of 300 waste pickers. Upgrading of the Matuail dumpsite of Dhaka was carried out as a part of a long-standing partnership between Dhaka City Corporation (DCC) and Japan International Co-operation Agency (JICA). In Moshi, Tanzania, due to financial constraints, the upgrade level achieved at the new disposal site at Kaloleni is mainly in terms of operation practices – expressed as 3Cs: Confine, Compact, Cover – rather than engineering controls installed. Nonetheless, this is an important step away from indiscriminate open dumping, and towards adequate environmental protection. Other cities have constructed or are in the process of constructing engineered landfills for their needs.

Rotterdam is the only reference city that incinerates all of its waste destined for disposal (i.e., excluding waste that is recycled). Kunming

is heading in this direction: it currently incinerates about 37% of its waste and landfills the rest. Furthermore, the incinerated proportion will increase in the near future, with a new incinerator under construction. According to the latest news, Delhi is about to join them with its Timarpur-Okhla incinerator, in a much disputed project being supported by the Clean Development Mechanism (CDM). At the other end of the spectrum, the Philippines banned incineration of municipal waste by its Clean Air Act (Republic Act 8749) of 1999.

Resource recovery

Some cities recover energy from their municipal waste. All other cities focus on material recovery.The highest material recovery rates have been identified in the cities where resource value is the main driver governing current developments in solid waste management. In Bamako, Mali, as in much of West Africa, raw organic waste is sold to grain farmers while partly decomposed organic waste is sold to the vegetable farmers in the floodplain of the Niger River. In itself, this traditional system of nutrient recovery would constitute a global good practice for others to learn from, were it not for the fact that the waste nowadays contains plastic waste, posing acute health risks to the cows that eat it.

At the other end of the modernization range, the U.S. cities of San Francisco and Ithaca in Tompkins County, and the Australian city of Adelaide are reaching similarly high recovery rates, in the region of 55 to 70%. This is due to their strong commitment to 'zero waste' policies and accompanying schemes for separate collection of organic waste and recyclables, which have in part developed as a way to divert waste from costly disposal at local state-of-the-art landfills. Problems – amounting to a crisis – with severe lack of disposal capacities have accelerated adoption and implementation of Zero Waste Resource Management policies in Quezon City as a part of Metro Manila, the Philippines.

The research has found that municipal organic waste is a heavily underutilized resource. While the organic fraction constitutes 60-80% by weight of municipal waste in most reference cities, there have been only modest initiatives to recover its value. This can be due to the lack of a market for compost, which takes focused effort and time to develop, by building urban-rural linkages and by educating potential users and buyers about compost's beneficial properties. The initiative by local professionals in Waste Concern, Dhaka, is a noteworthy exception: they managed to attract Dutch investors and obtain support from CDM, organize collection of organic waste from households and vegetable markets, and establish a community-based composting plant. In order to ensure sustainability of the system, they assist communities in marketing the product.

Governance and Inclusivity

Poor governance is a major reason why cities' solid waste and other urban systems fail. In examining governance aspects, *Inclusivity and equity of service users* comprises three distinct elements, namely (a) waste collection coverage, (b) consultation and involvement of users in decision-making on policy, planning and siting of facilities, and (c) formal procedures for measuring customer satisfaction and effective feedback mechanisms between service users and service providers. While the citizens in industrialized countries as well as former socialist countries such as China and Bulgaria receive waste collection services irrespective of their social status, waste collection services in mega-cities such as Nairobi, Delhi and Dhaka do not necessarily extend to peri-urban and slum areas. Cities like Belo Horizonte and Quezon City are well on the way to the goal of 100% coverage, thus including slum areas.

Inclusivity of service providers represents the degree to which both formal and informal, private or community-based service providers and waste recyclers are allowed equitable access to the

system. Though, the realities in a wide range of cities and towns cannot be refuted: informal-sector service providers are responsible for a significant percentage of waste collection.

Financial sustainability

Evaluation of a solid waste management system's financial viability is much more complicated than that of a commercial business. Solid waste management is a structured set of components, including collection, transport, resource recovery, processing, and disposal, each of which may be provided by a separate actor in the system. Secondly, solid waste management is a merit good – a good (service) deemed so important that the law requires that it is provided for the benefit of the entire society, regardless of the interest of the market to supply it or the users' ability (or willingness) to pay for it. This means that the role of government remains very strong, either in provision or regulation of the services. Thirdly, as it is practically impossible to exclude non-payers, the service is prone to 'free-rider' behavior. Due to this combination of reasons, cost recovery from paying users – though considered important – is not the central feature of financial management in most of our reference cities. Actually, the costs of the system are being recovered from a combination of sources, including: budgets allocated from the central government, donor loans, franchise fees, property taxes, waste service fees, and sale of municipal land and equipment.

The benefits of environmentally sound waste disposal are not obvious to most system users, except those living close to the dumpsite. Therefore, investments in landfill technology and full cost recovery from user fees are more likely in high-income countries. Middle- and low-income country cities largely struggle to finance environmentally sound waste disposal, even in mega-cities such as Delhi, where economies of scale would increase system efficiency. Recycling as a commodity trade is financed, as any other business, from sales revenues. This is the case with metals and high-grade paper, which combined constitute about 15% of municipal waste in the reference cities. Other materials may be technically recyclable but they often cost more to recycle than they are worth in the marketplace. Therefore, it is difficult to develop a sound business case without government interventions (either in the form of subsidies or market development). Arguably, much more material would be profitable to recover if the products were designed bearing in mind their next stage following use, where disassembly of parts and separation of ingredient materials would enable material recovery. The current strategic policy orientation towards prevention and reuse may be instrumental in prompting a change towards more reuse- and recycling-friendly product design.

Institutional framework

The strength and transparency of an institutional framework are essential to good governance in solid waste. Within ISWM, transparency and clarity of management structures, lines of accountability, contracting procedures, budgets, cost recovery and corruption, as well as labor practices are particularly examined. In the reference cities, There are examples of strong political commitment and leadership showing tangible results, Strong central planning and determined implementation, combined with privatization of street sweeping services and incineration, have resulted in reliable, robust and modern waste services in Kunming, despite inadequate cost recovery from the fees. Ghorahi, Nepal, has demonstrated that financial constraints can be overcome by committed leadership in combination with genuine participatory approach. As a small town in one of the lowest-GDP countries, Ghorahi has managed to construct and operate a modern landfill with no foreign financing. In contrast, in Managua, inadequate collection services can be ascribed to fragmentation of various solid waste functions with little central coordination, weak governance

and lack of political commitment, as well as lack of financial resources. Despite a number of studies aimed at modernizing solid waste management in Managua, which were carried out in the last 15 years and financed by the international donors, the city still has no disposal alternative to open dumping.

Conclusion

From this research, it is clear that, collectively, much progress has been made in solid waste management and recycling over the last 40 years. While solid waste management is a challenge in many cities, and it can pose public health and environmental risks, and even precipitate into political 'crisis' if it is neglected, it can also be a display of strong leadership and commitment to sustainable practices and equity of citizens, under all kinds of circumstances.

The stories from 20 reference cities show that it is possible to make progress in tackling solid waste management despite legitimate constraints. The methodology used in this research to profile cities' waste systems can be used to produce both a baseline document and a needs assessment for future intervention. This enables cities to identify the next steps in their development as a function of where they are now and where they wish to be. A reliable approach is to be open, critical and creative: starting from the existing strengths of the city and building upon them; involving all stakeholders to jointly design locally tuned models. Learning from each other in a community of practice provides an opportunity to 'pick and mix', adopt and adapt the solutions that will work in a particular local situation.

News

NSWAI visibility in ISWA General Assembly and ISWA World Congress :

On 14 November 2010, the ISWA General Assembly was held at the Hotel Grand Elysee in Hamburg. More than 70 ISWA Members were present, among them 37 National Member Representatives.NSWAI has attended the General Assembly as an incoming National Member from India.

The ISWA World Congress 2010 took place from 15 to 18 November in Hamburg, Germeny. Six hundred and thirteen delegates from 54 countries attended the Congress. The participants were offered a lot during these four congress days: More than 45 sessions with more than 150 high-profile presentations and speeches; 20 meetings; 7 Technical Tours.

From Left to Right: Mr. Jeff Cooper, President ISWA, Dr. Amiya Sahu, President NSWAI, Mr. Hermann Koller, Managing Director ISWA

Dr. Amiya Sahu attending the ISWA General Assembly, 2010.

Dr. Atilio Savino- Former President, ISWA and Dr. Amiya Sahu, President, NSWAI.

Events

National Upcoming Events

National Symposium Waste Management: Experiences and strategies
5-7 January 2011
Dept. of Agricultural Microbiology College of Horticulture Kerala Agricultural University, Thrissur-680 656
Phone: 09447977132,
Fax: 0487 2371994
Email: devakigirija@gmail.com
kausymp.wastemanage@gmail.com

Bhagirathi
Urban Waste Management quark 2011
3-6 Feb 2011
BITS Pillani K K Birla Goa campus
Website: *www.bits-quark.org*

Inclusive, Integrated Solid Waste Management (IISWM) 2011
10-12 Feb 2011
Pragati Maidan, New Delhi, India
Website: *www.ieffindia.in*

International upcoming Events

Waste and Recycling Expo Mexico
Mexico City, Mexico
23-25 March 2011
Messe Frankfurt Mexico,Leibnitz 162, Col, Anzures, 111590 Mexico D.F
Email: *Info@mexico.messefrankfurt.com*
Website: *www.wasterecyclingmexico.com*

ISRI Annual Convention and Exposition 2011 Los Angeles,California,USA
5-9 May 2011
ISRI,1615 L Street, NW, Suite 600,Washington,DC 20036-5610,USA
Tel + 1 202 662 8500, Website: *www.isri.org*

Waste Expo 2011
Dallas, Texas USA
10-12 May 2011
Kimberly Stolfi, Penton Buiseness Media Inc, 11 River Bend South, Stamford, CT 06907, USA
Tel +1 203 358 4252
Email: *Kimberly.stolfi@penton.com*
Website: *www.wasteexpo.com*

Waste to Energy 2011
Bremen,Germany Messe Bremen
17-19 May 2011
Wirtschaftsforderung, Bermen, Germany
Tel +49 421 350 50
Email: *info@messe-bremen.de*
Website: *www.wte-expo.de*

Solid Waste Treatment and Disposal: Leading Edge Technologies (Conference)
International Solid Waste Association (ISWA)
31 May – 2 June 2011
Moscow, Russia. IEC 'Crocus Expo'
E-mail: *waste-tech@sibico.com, info@sibico.com* - for general inquiries and information on the event
2011@sibico.com - to send information to the directory

We would appreciate your feedback on this newsletter and welcome you all to contribute articles, news or in any other form pertaining to the Waste Management issues, for publishing in our subsequent newsletters.

Visit us at: www.nswai.com

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