


[Home](#) > [Journal](#) > [Earth & Environmental Sciences](#) > [JEP](#)
[Indexing](#) | [View Papers](#) | [Aims & Scope](#) | [Editorial Board](#) | [Guideline](#) | [Article Processing Charges](#)
[JEP](#) > Vol.2 No.1, March 2011



## Selection of Landfill Sites for Solid Waste Treatment in Damaturu Town-Using GIS Techniques

PDF (Size: 481KB) PP. 1-10 DOI: 10.4236/jep.2011.21001

### Author(s)

Ayo Babalola, Ibrahim Busu

### ABSTRACT

Landfill has been recognized as the cheapest form for the final disposal of municipal solid waste and as such has been the most used method in the world. However, siting landfill is an extremely complex task mainly due to the fact that the identification and selection process involves many factors and strict regulations. For proper identification and selection of appropriate sites for landfills careful and systematic procedures need to be adopted and followed. Wrong siting of landfill many result in environmental degradation and often time public opposition. In this study, attempts have been made to determine sites that are appropriate for landfill siting in Damaturu town Nigeria, by combining geographic information system (GIS) and a multi-criteria decision making method (MCDM) known as the analytic network process (ANP) for the determination of the relative importance weights of factors (criteria). The land suitability output is presented from less suitable to the most suitable areas. The final map produced show areas that are suitable for landfill siting. Based on the analysis fourteen sites were identified to fulfill the required criteria, however, only seven met the land availability criteria of twenty hectares and above. The results showed the efficacy of GIS and multi-criteria decision making method in decision making.

### KEYWORDS

Municipal Solid Waste Management, Damaturu, Nigeria, Geographic Information System (GIS), Landfill Siting, Ikonos

### Cite this paper

 A. Babalola and I. Busu, "Selection of Landfill Sites for Solid Waste Treatment in Damaturu Town-Using GIS Techniques," *Journal of Environmental Protection*, Vol. 2 No. 1, 2011, pp. 1-10. doi: 10.4236/jep.2011.21001.

### References

- [1] P. J. Rao, V. Brinda, B. S. Rao and P. Harikihna, " Selection of Landfill Sites for Solid Waste Management in and around Visakhapatnam City-A GIS Approach," *Asian Journal of Geoinformatics*, Vol. 7, No. 3, 2007, pp.35-41.
- [2] M. Rahman and A. Hoque, " Site Suitability Analysis for Solid Waste Disposal using GIS: a Case Study on KCC Area," *The Journal of Geo-Environment*, Vol. 6, 2006, pp. 72- 86.
- [3] L. Koshy, P. Emma, L. Sarah, J. Tim and B. Kelly, " Bioreactive of Leachate from Municipal Solid Waste Assessment of Toxicity," *Science of the total Environment*, Vol. 384, No. 1-3, 2007, pp. 177-181. doi: 10.1016/j.scitotenv.2007.06.017
- [4] S. Sakai, S. E. Sawell, A. J. Chandler, T. T. Eighmy, D. S. Kosson, J. Vehlow, H. A. Van der Sloot, J. Hartlen and O. Hjelm, " World Trends in Municipal Solid Waste Management," *Waste Management*, Vol. 16, No. 5-6, 1996, pp. 341-350. doi:10.1016/S0956-053X(96)00106-7
- [5] A. Imam, B. Mohammed, D. C. Wilson and C. R. Cheeseman, " Solid Waste Management in Abuja, Nigeria," *Journal of Waste Management*, Vol. 28, No. 2, 2008, pp. 468-472.
- [6] J. B. Olaleye and J. O. Sangodina, " Environmental Protection and Management," Paper presented at the 32nd Surveyors' Annual General Conference, Nigeria, 2000.

- [Open Special Issues](#)
- [Published Special Issues](#)
- [Special Issues Guideline](#)

[JEP Subscription](#)
[Most popular papers in JEP](#)
[About JEP News](#)
[Frequently Asked Questions](#)
[Recommend to Peers](#)
[Recommend to Library](#)
[Contact Us](#)

Downloads:	300,258
Visits:	671,350

### Sponsors, Associates, and Links >>

- [The International Conference on Pollution and Treatment Technology \(PTT 2013\)](#)

- [7] GeoNames. " Geographical Database" , 2010. Internet Available:  
<http://www.geonames.org/search.html>
- [8] S. Mohan and R. Gandhimathi, " Solid Waste Characterization and Assessment of the Effect of Dumping Site Leachate on Groundwater Quality: A Case Study," International Journal of Environment and Waste Management, Vol. 3, No. 1-2, 2009, pp. 65-77. doi:10.1504/IJEWM.2009.024700
- [9] O. Al-jarrah and H. Abu-Qdais, " Municipal Solid Waste Landfill Siting Using Intelligent System," Waste Management, Vol. 26, No. 3, 2006, pp. 229-306.
- [10] V. Akbari, M. A. Rajabi, S. H. Chavoshi and R. Shams, " Landfill Site Selection by Combining GIS and Fuzzy Multi-Criteria Decision Analysis, Case Study: Bandar Abbas, Iran," World Applied Sciences, Vol. 3, No. 1, 2008, pp. 39-47.
- [11] S. A. Mahini and M. Gholamafard, " Siting MSW Landfills with A Weighted Linear Combination Methodology in A GIS Environment," International Journal of Environmental Science Technology, Vol. 3, No. 4, 2006, pp. 435-445.
- [12] T. Hatzichristos and M. Giaoutzi, " Landfill Siting Using GIS, Fuzzy Logic and Delphi Method," International Journal of Environmental Technology and Management, Vol. 6, No. 1-2, 2006, pp. 218-231. doi:10.1504/IJETM.2006.008263
- [13] M. Z. Siddiqui, J. W. Everett and B. E. Vieux, " Landfill Siting Using Geographic Information Systems: A Demonstration," Environmental Engineering, Vol. 122, No. 6, 1996, pp. 515-523. doi:10.1061/(ASCE)0733-9372(1996)122:6(515)
- [14] D. S. Stinnette, " 10 Steps to Successful Facility Siting," 1996. Waste age, Internet Available:  
<http://wasteage.com>
- [15] S. Sadek, E. F. Mutasem and F. Fadel, " Compliance Factors within A GIS-Based Framework for Landfill Siting," International Journal of Environmental Studies, Vol. 63, No. 1, 2006, pp. 71-86. doi:10.1080/00207230600562213
- [16] A. Manu, Y. A. Twumasi, T. L. Coleman, I. A. Maiga, and K. Klaphake, " Database Development for Urban Planning Using Photogrammetry and GIS Techniques: The Case of Niamey," Niger.Paper presented at the 5th African Association of Remote Sensing of the Environment (AARSE Conference), Nairobi, 2004.
- [17] T. L. Saaty, " Decision Making with Dependence and Feedback: The Analytical Network Process," RWS Publication, 4922 Ellsworth Avenue, Pittsburgh, 1996.
- [18] T. L. Saaty, " Theory and Application of Analytical Network Process," RWS Publication, 4922 Ellsworth Avenue, Pittsburgh, 2005.
- [19] E. W. L. Cheng and L. Heng, " Contractor Selection Using Analytical Network Process," Construction Engineering and Management, Vol. 131, No. 4, 2005, pp. 459- 466. doi:10.1061/(ASCE)0733-9364 (2005)131:4(459)
- [20] T. P. IAEA, " Isotope-Based Investigations In the Chad Basin Aquifers. Abuja: Department of Hydrology and Hydrogeology," Federal Ministry of Water Resources, 2005.
- [21] C. Udornporn, W. Wanpen, C. Punya, M. William and L. Rungruang, " Landfill Site Characterization Kham Bon Village, Muang District, Khon Kaen Province, NE Thailand," International Journal of Environment and Waste Management, Vol. 4, No. 2-3, 2009, pp. 299-321.
- [22] T. D. Kontos, D. P. Komilis and C. P. Halvadakis, " Siting MSW Landfills with A Spatial Multiple Criteria Analysis Methodology," Waste Management, Vol. 25, No. 8, 2005, pp. 818-832. doi:10.1016/j.wasman.2005.04.002
- [23] L. Zhilin, Z. Qing and G. Christopher, " Digital Terrain Modeling Principles and Methodology," CRC Press, 2005.
- [24] D. J. Lober, " Resolving the Siting Impasse: Modeling Social and Environmental Locational Criteria with Geographic Information System," American Planning Association, Vol. 61, No. 4, 1995, pp.482-495. doi:10.1080/01944369508975659
- [25] G. Tchobanoglous, H. Theisen and S. A. Vigil, " Integrated Solid Waste Management," McGraw-Hill International Editions, 1993.

[26] E. V. Baxter, " Distributed Hydrologic Modeling Using GIS," Vol. 48, 2nd Ed. Dordrecht| Boston| London: Kluwer Academic, 2004.

[27] K. T. Chang, " Introduction to Geographic Information System" , 5th Ed., Mc Graw-Hill International Edition, 2010.

[Home](#) | [About SCIRP](#) | [Sitemap](#) | [Contact Us](#)

Copyright © 2006-2013 Scientific Research Publishing Inc. All rights reserved.