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Assessment Of Surrouding Property Value Depreciation Due To Msw Landfills - A Case Study

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Abstract: *The most common means for disposing of municipal solid waste is burial in a sanitary landfill. The existence of municipal solid waste (MSW) landfill in a place will have a huge physical and social impact on the adjacent community. One of the most dominant and alarming social impact of the landfill existence and operation is the property value depreciation in the neighbourhood society. This paper proposes an approach to determine the cumulative property value depreciation of the surrounding areas due to landfill existence. All cost information is based on the prevailing economic conditions in Kerala. The approach is illustrated by applying it to a case study of an existing landfill at Njeliyanparamba in Kozhikode district (Kerala.). This case study demonstrates that the method can be applied easily and yields reasonable results.*

Keywords *- Municipal solid waste, Landfill, Social cost, Property value depreciation*

I. Introduction

The most common means for disposing of municipal solid waste is burial in a sanitary landfill. Garbage disposal has become an increasingly serious problem in urban, densely populated areas, where the main reasons for concern are dwindling landfill space and the environmental problems experienced with existing, old landfills, such as contamination of groundwater, odours and aesthetic deterioration of the environment (Stephen Hirshfeld, 1989). Municipal solid waste landfills are notorious for having adverse impacts on those within their sphere of influence during the active life of the landfill (the period of time that wastes are received by the landfill). This situation leads to a justified NIMBY ("not in my backyard") attitude on the part of the public (Gamble, 1982).

Little effort has been made to quantify the costs of the environmental and social impacts of landfills, and most published studies focus on only one of the many external costs. Perhaps the paucity of work in this area is a result of the subject's elusiveness; any generalized study of external costs will necessarily be inexact and lacking complete objectivity. It is crucial to attempt to value externalities in real monetary terms, because economic analysis is usually the basis for evaluating activities which bear on the natural environment (Stephen Hirshfeld, 1989).

The total cost of landfill disposal is often significantly underestimated by considering only land and operating costs, ignoring external physical and social costs associated with landfills. Ignoring such costs may underprice landfills, which in turn may inhibit the development of other waste management options, such as waste reduction, recycling and resource recovery. These options are frequently perceived as being more expensive than landfilling. Among the social cost due to the landfill existence and operation, the depreciation of property values adjacent to the landfill site is the most critical and threatening factor that determines the overall cost of the landfill (Anon, 1983).

It may be assumed that the impact of a landfill on surrounding property values reflects the local effects of altered traffic patterns, air pollution, visual unattractiveness and noise pollution. Thus, if property values prior to the landfill's existence are well known, the cumulative value of most landfill social impacts (i.e. traffic, air, noise, and aesthetics) may be found by measuring the decreases in property values (Pettit C. L, 1987).

Properties closer to a landfill lose more value than properties further away from it. The amount of property depreciation decreases with distance from the landfill. At a given distance from a landfill, more valuable properties lose a greater percentage of their worth than do less valuable ones. Landfills can depress the values of properties up to a particular distance only.

Previous studies in this field suggest that a landfill is likely to inflict the greatest cumulative property depreciation in high density urban areas, where property values are high and distances between adjacent properties are small. Studies (Zeiss.C, 1989) have shown that properties near landfills appreciate more slowly and in these instances more expensive homes are impacted to a greater degree than less expensive ones.

The major objective of this paper is to propose an approach to determine the cumulative property value depreciation of the surrounding areas due to landfill existence. This will contribute a major portion of the social cost associated with the landfill. The approach presented in this paper could improve the accuracy of landfill cost assessments. In turn, improved cost assessments may encourage improved environmental protection and energy conservation, partly due to the accelerated development of non-landfill waste management alternatives like recycling, source reduction, etc.

II. Proposed Approach To Evaluating The Property Value Depreciation

It may be assumed that the impact of a landfill on surrounding property values reflects the local effects of altered traffic patterns, air pollution, visual unattractiveness and noise pollution. Property values are affected by their proximity to a new landfill.

From the local authorities like registrar office, the details regarding the land transactions for recent few periods should be collected. From the addresses of the parties involved in the transaction, they can be located. They may be consulted for obtaining the actual land price, since the prices in the office records could be too low and nowhere near the real prices. The prices so obtained can be added as point features on the digitised map of the area at the centroids of the corresponding land piece using a GIS Software. The land prices may be then interpolated to get the land prices of the areas where trasactions did not happen in the recent past.

In order to get an estimate the land price depreciation, a graph is plotted showing the land price along y- axis and distance from landfill along x- axis. A section passing through the landfill and covering maximum distance should be considered. The linear portion of the graph is linearly extended to meet the curve again. The price shown by the extended line is assumed as the price of the property in the absence of landfill. From the graph, it can be ensured that this will never be an over estimation of the loss of property value.

Using GIS tools the land area corresponding to each price slab is obtained. From the land price vs. distance from landfill graph, the expected prices of the corresponding pieces of land in the absence of land fill can be obtained. From these the cost depreciation for the entire area can be easily calculated.

III. Case Study

The site for processing and disposal of the waste from Calicut corporation is located at Njeliyanparamba at Calicut city in Kerala. Njeliyanparamba landfill site is situated in Cheruvannur Panchayat on NH17 about 8km from the city centre. A waste treatment and processing plant is situated near the landfill site. The whole landfill site along with the waste treatment and processing plant spread over an area of 7.41 Ha.

IV. Surrounding Property Value Depreciation Of The Study Area

In order to compute the surrounding property value depreciation rate, the following method was adopted.

A visit was made to the Sub-registrar office at Feroke where the land transactions done in the study area are registered and the details regarding the transactions for the past six years were obtained. From the addresses of the parties involved in the transaction, they were located. They were consulted for obtaining the actual land price, since it was very clear that the prices in the office records were too low and nowhere near the real prices. (The details of transactions are given in Appendix 1).

The prices so obtained were added as point features on the digitised map of the area at the centroids of the corresponding land piece using a GIS Software. The land prices were then interpolated to get the land prices of the areas where trasactions did not happen in the recent past. The graphical representation of property values obtained from the GIS is shown in Fig.1. From the figure, it is clear that properties closer to a landfill has lower value than properties further away from it.

In order to get an estimate the land price depreciation, a graph was plotted showing the land price along y- axis and distance from landfill along x- axis. A section passing through the landfill and covering maximum distance was considered. The section whose details are given in graph is shown in Fig.2. The graph showing variation in land price is shown in Fig.3.

The portion AB of the graph is linearly extended to meet the curve again at D. The price shown by the extended line (BD) is assumed as the price of the property in the absence of landfill. It is clear from the graph that this will never be an over estimation of the loss of property value. This method was used because as we move further away from the landfill towards south (away from Calicut City), the price again increase because of the nearness to Feroke town. Using GIS tools the land area corresponding to each price slab is obtained. From the graph (Fig. 3), the expected prices of the corresponding pieces of land in the absence of land fill is obtained. From these the cost depreciation for the entire area is obtained.

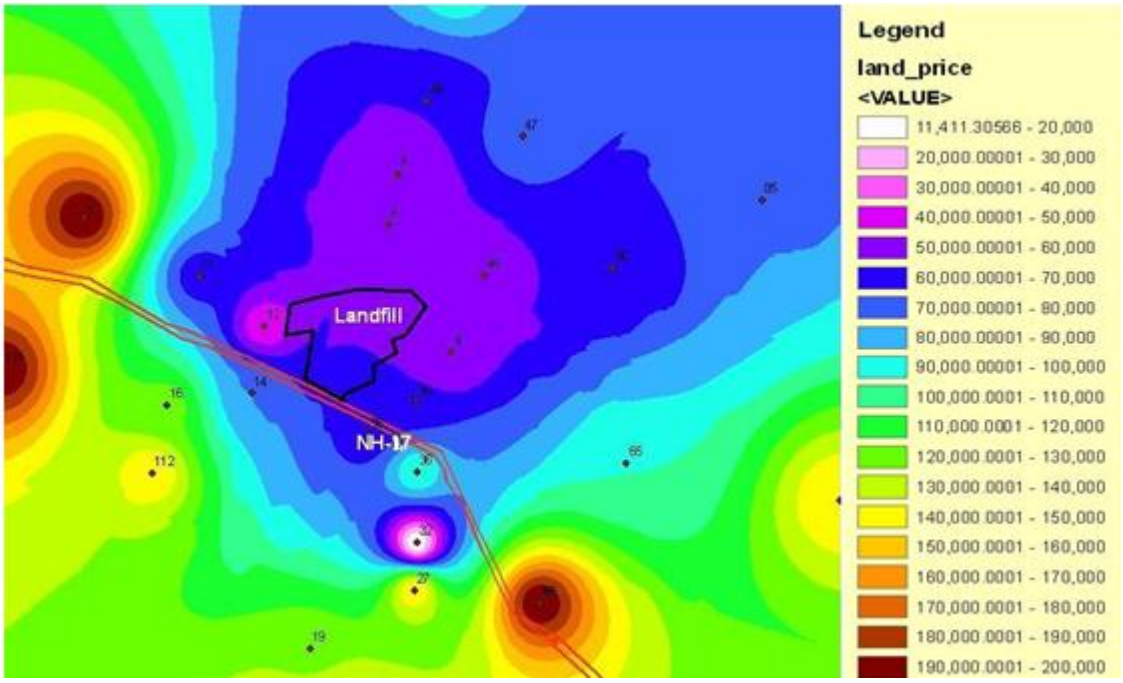

Fig.1. Representation of property value depreciation around landfill in GIS

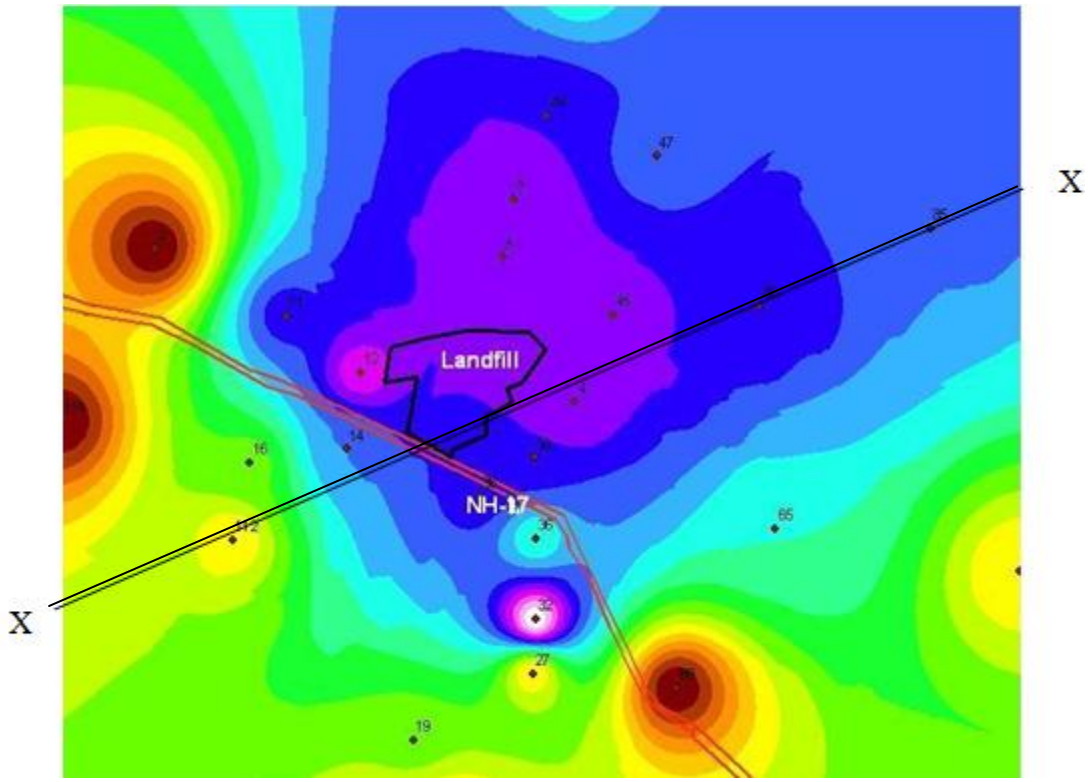

Fig.2. Representation of coordinate axis X-X for showing property value depreciation

V. Result

From the study, it is clear that the property value depreciation is very drastic in a radius of about 1km around the landfill site (refer Fig.2 and Fig.3). Beyond this range, the effect of the landfill is getting reduced. The various results obtained in the study are

1) Properties closer to a landfill lose more value than properties further away from it.
2) The amount of property depreciation decreases with distance from the landfill.
3) At a given distance from a landfill up to 1 km, the property value depreciation is very drastic.
4) Price depreciation of the surrounding affected area is obtained to be Rs 64.992 crores.

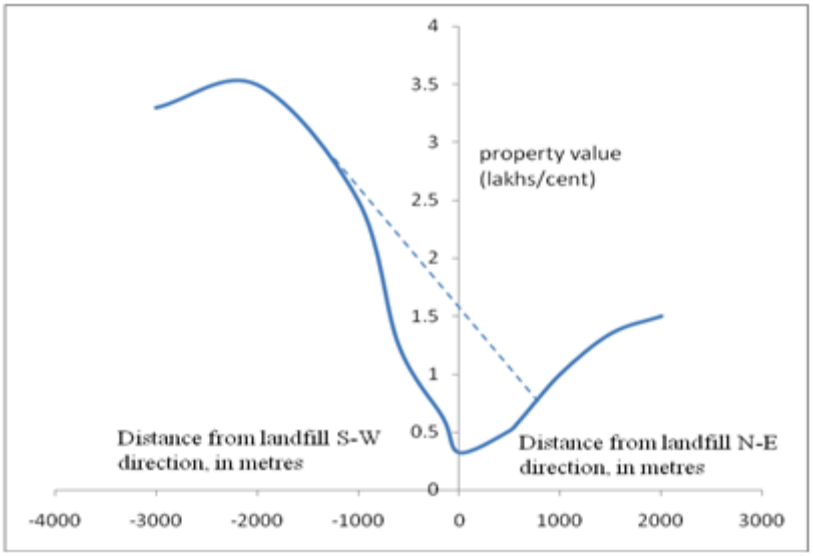

Fig.3. Variation of property value with distance from landfill in X- X axis

VI. Calculations

Area of zone having property value of Rs 35,000/cent = 7302.88 cent
Price of this area in the absence of landfill = Rs 1,00,000/cent
Area of zone having property value of Rs 40,000/cent = 486.8 cent
Price of this area in the absence of landfill = Rs 1,40,000/cent
Area of zone having property value of Rs 60,000/cent = 6328.38 cent
Price of this area in the absence of landfill = Rs 80,000/cent
Total Cost depreciation = Σ (area of price slab x price reduction)
Total land value depreciation = 486.8 (1.4 – 0.4) + 7302.8 (1 – 0.35) + 6328.38 (0.8 – 0.6)
= **Rs 64.992 crores**.

Therefore price depreciation of the surrounding affected area is obtained to be **Rs 64.992 crores.**

VII. Conclusion

Although landfilling is a well established waste disposal method, the authorities significantly underestimate their landfill costs. This is primarily a result of failure to place reasonable costs on the physical and social impacts associated with landfills. Social impacts are a consequence of the landfill's existence. Among the social impacts, the most important and critical factor is the adjacent property value depreciation. Computation of the property value depreciation value by employing GIS software gives accurate results and it also helps in obtaining thedetails of land prices of the areas where trasactions did not happen in the recent past. Losses in property values typically are borne unfairly by residents living close to new landfills. In fact, public opposition to the siting of new landfills is due largely to anticipated losses in property values. Given the typical strength of such opposition, and the equal utility that a municipal landfill provides for all users, regardless of proximity to the landfill, it seems reasonable that the community consider compensating property owners living near a proposed landfill site.

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APPENDIX

Land Transaction Details in the Study Area

Table.1.: Land Transaction Details in the Study Area from 2003 Onwards
(Source: Sub-registrar office, Feroke)

1.

Sl. No.	Survey No.	Parties Involved	Land Area (in cent)	Land Price per cent as per Records	Land Price per cent Revealed by parties
11	38/2	Alappurath Dinesh Babu & Alappurath Prakash Babu	18	Rs 12000	Rs 62000
22	39/1	Ezhuthupalla parambu Moitheen koya & Ezhuthupalla parambu Ummer koya	4	Rs 25000	Rs 60000
33	40/1	P.Muhammed Haji,Ellikkal & C.S Sujathan,Sopanam	220	Rs 25000	Rs 35000
44	12/1/A1	Shajahan Vadakkeveedu & C.S sujathan, Sopanam	4.125	Rs 25000	Rs 40000
55	14/1/B1	Abdul Saleem Thottathil & Muhammed Afsal,Rahmath	5.125	Rs 50000	Rs 80000
66	18/1	Narayanan Thalathil & Rajkumar Jyothis	8.50	Rs 8000	Rs 120000
77	10/1	Fathima Arackal & Suhara Naluparambil	3	Rs 15000	Rs 33333
88	36/1/A	Kollambalam Sanal kumar & Kollambalam Anil kumar	4.13	Rs 60000	Rs 100000
99	1/2A	Attingal Ali & Kallakkal Sainaba	10.75	Rs 125000	Rs 200000
110	60/3	Kattayad Abubekkar & Pangattu Mujeeb Rahman	3	Rs 35000	Rs 60000
111	45/2	Thottathil Sarassu & Theverparambil Ashok Kumar	6.08	Rs 35000	Rs 50000
112	65/7	Paradan Mammukoya & Peringalakkodu Muhammed	9.125	Rs 40000	Rs 60000
113	19/1B	Parambil Gokul Kumar & Puthiyapurayil Zacharia	9	Rs 80000	Rs 125000
114	32/3A	Thayyullil Muhammed Valiyapeedikkal Shajahan	7.29	Rs 75000	Rs 114000
115	49/1	Thazhethalakkal Rasiya & Nalakattu Muhammed	12.03	Rs 40000	Rs 60000
116	5/1	Fathima Parathondiyil & Muhammed Yosi, Puthenpura	12.125	Rs 30000	Rs 50000
117	79/2	Shamsija Padannayil & Kalathil Subaitha	8.5	Rs 110000	Rs 150000
118	47/3	Nisar Nettottuparambil & Rubeena Muhammed Arackal	15.5	Rs 50000	Rs 80000
119	11/5	Thottathil Sherif & Pallikkal Rukhiya	25	Rs 45000	Rs 650000
220	64/3	Farukke Rinusainu & Athanikkal Gopalan	7.35	Rs 50000	Rs 85000
221	27/1A	Mullakkal Sauda & Puthezhathu Sankarankutty	6.44	Rs 100000	Rs 140000

* Former Party sold his property and latter purchased that property

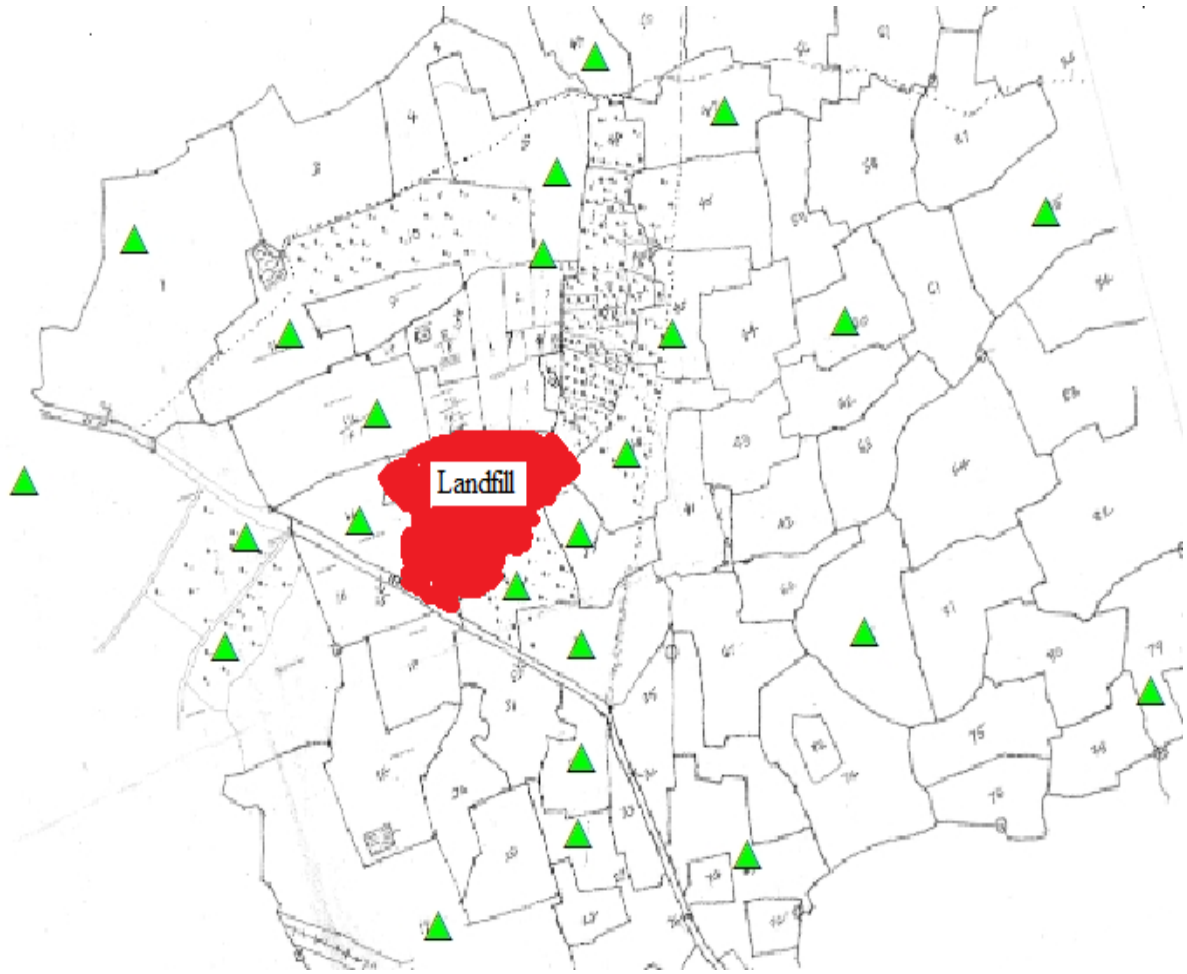

Fig.4. The locations of the property plots whose property values are used for the analysis of property value depreciation rate.

*The triangular points indicate the location of property plots and the dark shaded portion shows the landfill area.