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Beacons of litter: A social experiment to understand how the presence of certain littered items influences rates of littering

Rose Tehan, Lorna Jackson, Holly Jeffers, Tim Burns

Litter and social practices

Dr Liz Brooks and Professor Simin Davoudi

A case-study on the Repurpose project: A London estate-based pilot tackling fly-tipping through reuse

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Keep Britain Tidy has been working to keep the country clean for nearly 60 years and has expertise and access to a range of stakeholders in the area of litter and environmental quality. Within Keep Britain Tidy, the Centre for Social Innovation serves as an innovation hub to design and develop new approaches towards change that benefit society.

The Journal of Litter and Environmental Quality has been created by the Centre for Social Innovation as an open-access, peer-reviewed Journal that will share and discuss the latest research carried out by academics, practitioners and wider stakeholders into litter and environmental quality.

Litter refers to waste products that have been disposed off improperly, without consent, at an inappropriate location.

Environmental quality refers to the standard of the local area and includes all/any issues that might affect the appearance of the area and/or how people perceive the area.

The Journal is available for download from the Keep Britain Tidy website www.keepbritaintidy.org

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FOREWORD

Litter has a significant and detrimental impact on wildlife and the natural environment. The quality of the environment is a concern to everyone and I believe an acknowledgement that we all have a responsibility to care for the natural world will lead to a better society for all. As a naturalist, I am aware of the human impact on the world around us and see litter as a stark and unwelcome example of this.

I am therefore delighted to write this foreword for the inaugural issue of the Journal of Litter and Environmental Quality, a peer-reviewed Journal of a new kind. With its broad scope of insights into the behaviours that lead to litter and the erosion of environmental quality, the Journal creates a much needed global platform for debate and discussion on solutions for tackling littering behaviour. It provides a space for innovative research, diverse opinions and thoughts and ideas that we can share to create the change that will lead to improved local environmental quality for people and animals alike.

The articles in this first edition touch on some varied issues related to litter. These range from setting the policy framework and investigating what are the most littered items to examining ways of strengthening communities, improving education in schools on litter, and tackling relevant and potentially devastating topics such as fly-tipping. I am sure that, like me, you will find that these articles leave you wondering what you can do to further tackle the scourge of polluting litter, no matter the sector you work in.

I applaud Keep Britain Tidy for developing the Journal of Litter and Environmental Quality; a publication that bridges the gap between academics and practitioners engaged in helping us to understand littering behaviour and finding ways to stop it. This world-first provides a network of ideas, actors and opportunities that will collectively raise the environmental quality of the world that we live in.

Chris Packham

Naturalist and TV presenter

2017 REPORT TO READERS

Keep Britain Tidy has been working to look after our environment for more than 60 years. Our Centre for Social Innovation is leading the way on applying behavioural insights to changing littering behaviours. An important part of our work also involves undertaking research and using it to develop targeted and effective approaches to preventing litter and improving local places. We have long championed the use of quality research and evidence in the development of wider practice in the field and it is therefore with great pleasure that I introduce you to the first edition of the Journal of Litter and Environmental Quality. The Journal, developed by Keep Britain Tidy's Centre for Social Innovation, is a world-first in focusing on the issue of litter and environmental quality.

We know that the issue of litter is one that is not limited to environmental science but, rather, spans different fields including behavioural science, geography, climate change and psychology. This Journal showcases the latest research and case studies on the issue from academics and practitioners from across a range of fields and disciplines. Through it we hope to encourage the practical application of research findings, and spreading of new ideas and best practice; ultimately stimulating new research into these key environmental and social issues. Furthermore, we believe the Journal provides a much needed opportunity to draw together different specialist areas and create new networks to help build solutions for litter and other environmental issues that we are dealing with today.

In this first edition, we have an excellent mix of articles by academics and practitioners.

The 'beacons of litter' article by Tehan et.al presents a social experiment that tested whether the **presence of certain types of litter types are more likely to attract littering** than other types of litter.

The research suggested that the presence of large, salient litter items increases the likelihood of additional litter being dropped and reducing the amount of these litter items on the ground would work to reduce overall littering rates in the area.

The article by Brooks and Davoudi draws from existing literature on litter to develop a **framework** for the deeper understanding of litter and, consequently, better policy responses. The article examines different types of litter, looks at their prevalence and impact and then examines the theories of change that underlie current policies and campaigns to combat litter.

The Phillips article on the Repurpose Project provides a practical example of a London estate-based pilot tackling **fly-tipping through resident engagement** programme and reuse service. It provides data on the success of the programme in encouraging reuse and avoiding fly-tipping and some preliminary results on its effects and its impact on the attitude of residents to the disposal of unwanted items.

The article about education and litter by Phillips and Holt provides an overview on how **litter education** has many positive impacts on pupils' education, with the case studies as examples.

Finally the article by Monck provides opinions on why **community action and engagement** is essential to reducing litter.

I welcome you to read, share and enjoy the articles and hope that you will consider contributing your ideas, thoughts and opinions in the future.

I would like to thank the staff at Keep Britain Tidy who helped co-ordinate the publication and editing of this Journal. I would also like to thank our peer reviewers and our esteemed authors without whom the Journal of Litter and Environmental Quality could not be possible.

I hope that the arguments in this Journal instigate discussions and debates about the latest emerging issues in litter and environmental quality.

Lizzie Kenyon

Director, Centre for Social Innovation

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Beacons of litter is a social experiment that tested whether the presence of certain litter types is more likely to attract littering than other litter types. This builds on theory suggesting more litter accumulates where litter is already present. Specifically, this work tested whether big, bright, branded litter items ('beacons' of litter) attracted more litter than other, smaller, less salient litter items (e.g. paper, tissue, plastic wrapping). This experiment was carried out at two test locations under three conditions;

- one with 'beacon' litter items planted around the sites
- one with 'other' litter items planted around the sites and
- a control condition with no planted litter items.

The impacts on littering behaviour in the two areas were then measured through litter counts and behavioural observations. Overall, the largest amount of littering (as a proportion of all occurrences of waste disposal) occurred under the 'beacons' condition (35%) compared with 22% during the 'other' condition, and 17% under the control. Littering of 'beacons' items was also highest when other 'beacons' items were present (41%), compared with the 'other' (11%) and control (10%) conditions.

The research therefore suggests that the presence of large, salient litter items increases the likelihood of additional litter being dropped, and reducing the amount of these litter items on the ground would work to reduce overall littering rates in an area.

16 Litter and social practice - Dr Liz Brooks and Professor Simin Davoudi

This article draws from the existing literature on litter to develop a framework for a deeper understanding of litter and consequently better policy responses. It aims to address three key questions: What are the different types of litter? What are their prevalence and impacts? What implicit theories of change underlie current policies and campaigns to combat litter?

The paper begins by outlining a typology of litter based on its origin in different kinds of social practices, from 'eating on the go' to consuming drugs in public places. It goes on to explore the prevalence and impacts of litter, further categorising litter by its environmental and human impacts and the effects of its single and cumulative occurrence (the latter including co-occurrence of different types of litter and of litter with a range of other environmental incivilities such as fly-tipping and graffiti).

PAGE TITLE

The social practices approach allows insight into two important aspects of littering: its 'rise and fall' in connection with various social, legal, industrial and technological changes; and its links to the life lived out of doors, on the street or using transport. These insights are developed to show that current policy targeting the range of agents responsible for littering based on a linear model of causality is unlikely to gain significant success in the long term. The review concludes by noting the need to develop policy through the investigation of how theories of social and societal change might apply to littering.

26 A case-study on the Repurpose project: a London estate based pilot tackling fly-tipping through reuse - Rebekah Phillips

The fly-tipping of bulky waste items by local residents on housing estates is a common problem negatively affecting the local environment. Borough-wide bulky waste services are often inaccessible to estate residents and estate based clearance systems encourage local dumping. The EU-funded pilot Repurpose programme (2014-2017), managed by Groundwork London in partnership with the London Community Reuse Network and Middlesex University, takes a new approach to this problem. This case study provides an overview of the project and findings so far. The programme includes a thorough evaluation and full results will be available at the end of June 2017.

33 Educating on litter in schools - Dr Morgan Phillips supported by Emily Holt

Education is an important part of creating solutions for litter problems. This article uses the Eco-Schools programme to highlight how litter education has many positive affects on a pupils' education including developing knowledge, skill sets, values and attitudes. Case studies are provided to demonstrate the benefits to pupils, schools and the community as a whole.

37 Strengthening communities by reducing litter - George Monck

This thought piece uses the example of the Beautiful Boroughs project run by CleanupUK in 11 London boroughs to highlight how strong community involvement of local residents can complement the cleansing work Councils do and create cleaner neighbourhoods.

JOURNAL OF LITTER AND ENVIRONMENTAL QUALITY

The Journal of Litter and Environmental Quality would not have been possible without the commitment and hard work of our peer reviewers. They provide not only the information needed for publication decisions but also valuable critiques for authors. We offer our sincerest thanks to the following reviewers who served as referees for the Journal.

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BEACONS OF LITTER: A SOCIAL EXPERIMENT TO UNDERSTAND HOW THE PRESENCE OF CERTAIN LITTERED ITEMS INFLUENCES RATES OF LITTERING

Rose Tehan is a Market Research Manager in Keep Britain Tidy's Centre for Social Innovation, which she helped to establish in 2013. Rose holds a BA Social Science (Environment). She specialises in collaborative and action-based social research, and has extensive experience in designing and testing behavioural interventions in the field.

Lorna Jackson works as a Senior Researcher in Keep Britain Tidy's Centre for Social Innovation and holds an MSc in Environmental Psychology from the University of Surrey and a BSc (Hons) in Psychology from the University of Liverpool. Her past research has involved looking at the role of values and empathy in increasing engagement with climate change communications.

Holly Jeffers worked as a Researcher in Keep Britain Tidy's Centre for Social Innovation. Holly has a BSc in Physical Geography from the University of Leeds and since leaving her role at Keep Britain Tidy has gone on to work for the Department of Business Energy and Industrial Strategy in their Smart Energy Team.

Tim Burns has 15 years of experience working in the charity sector focusing on the environment including transport, food, resource management and conservation. Tim worked for the charities Waste Watch and Keep Britain Tidy, where he was involved in establishing the Centre for Social Innovation. Tim now works as a Senior Policy Advisor for Sustrans.

INTRODUCTION

Background

As part of the Defra-funded Social Innovation to Prevent Littering programme, Keep Britain Tidy partnered with local land managers to deliver a series of experiments aimed at changing littering behaviour. The experiments aimed to build evidence on the behavioural drivers of littering with a view to identifying interventions that could be implemented by other land managers and successfully scaled across England.

In November and December 2014, Keep Britain Tidy partnered with Dudley Metropolitan Borough Council and the London Borough of Hackney in a new experiment to understand how the presence of certain types of litter influences waste disposal behaviours. The experiment drew on previous research that provides insight into how the presence of litter can lead to further littering (Cialdini et al, 1990; Keep Britain Tidy, 2012, 2015; Raihani and Hart, 2010).

Keep Britain Tidy (2012) found that people are more likely to litter where litter is present. The presence of litter can therefore act as both an environmental cue (indicating the cleanliness of a site) and a social cue (implying a level of social acceptability towards littering at the site). Further research (Keep Britain Tidy, 2015) built on this insight to identify how people perceive certain types of litter to be more prevalent and prominent than others. These items tend to be larger, brighter, often branded pieces of litter, such as drinks containers, takeaway boxes and plastic bags. Therefore, Keep Britain Tidy wanted to test whether these items act as 'beacons of litter' by attracting more litter. The results of the experiment could help to identify whether cleansing routines that maintain acceptable standards of cleanliness, but which focus predominantly on the removal of large/salient/branded items of litter, consequently reduce the amount of litter dropped in the area. Ultimately, this could increase the effectiveness of cleansing staff, allowing sites to be cleansed more quickly, and wider areas to be reached.

Aim and objectives

The overall aim of the experiment was to identify how cleansing routines could potentially be adjusted for maximum effectiveness and efficiency.

The objectives of the experiment were to identify:

- the impacts of ‘beacons’ and ‘other’ litter items on observed littering behaviours and the accumulation of litter at the sites
- the impacts of ‘beacons’ and ‘other’ litter items on the types of litter dropped
- how cleansing routines can be adjusted for maximum effectiveness and efficiency.

METHODOLOGY

The experiment was conducted at main retail and commercial sites within the two partner areas. Within these locations Keep Britain Tidy and partners planted ‘beacon’ and ‘other’ items of litter and monitored disposal behaviours over two-hour observation sessions. Following each observation session a litter count was conducted to record the accumulation of litter at each site.

Testing took place under three conditions:

- Control: Site cleansed to a Grade A standard (completely free from litter) at the beginning of the testing session.
- Beacons: Following a cleanse to a Grade A standard, 25 items of ‘beacon’ litter (large, bright and/or branded items of food and drinks litter) were planted throughout the site.
- Other: Following a cleanse to a Grade A standard, 25 items of ‘other’ litter (smaller, less noticeable litter) were planted throughout the site.

Under all three conditions, litter dropped by people at the site during the two-hour monitoring period was left to accumulate.

Partner selection

Local land managers were invited to express interest in partnering with Keep Britain Tidy for the experiment through the Keep Britain Tidy Network. Partnering involved selecting up to three main retail and commercial sites for the research and cleansing these to a Grade A standard of cleanliness at the beginning of each day of testing at the sites. Partners also ensured that no street cleansing took place at the sites during the testing, however, they were asked to empty any street bins as usual so as not to influence rates of littering. In return, local land managers were given the opportunity to gain evidence and insights into the litter issues and waste disposal behaviours present in their areas to inform their future work, as well as opportunities for adjusting their cleansing routines accordingly. Those local land managers who expressed an interest participated in an informal telephone interview to discuss their suitability for partnering in the experiment. Those who were selected for the partnership demonstrated a strong interest in improving environmental quality in their area, were committed to the experiment and represented a range of geographic locations. The selected partners were Dudley Metropolitan Borough Council and the London Borough of Hackney.

RESEARCH SITES

Site selection

Keep Britain Tidy chose to conduct the research at main retail and commercial sites due to the typically high levels of footfall at these sites and the large amounts of time and money generally spent on cleansing this land type. The sites were selected in consultation with the partners, and were followed by site visits to determine their suitability for the research.

The criteria for selecting the research sites were

- they had high levels of footfall during daytime hours when the research was due to take place; and
- there were other sites in the area where the testing could simultaneously be conducted that were comparable in terms of physical environment, visitor demographic and use.

This allowed Keep Britain Tidy to reduce the impact of these variables on the research. The sites chosen for the experiment were two public squares in Stourbridge town centre and three sites along a single high street in Hackney, London, as described below.

Stourbridge, Dudley

Stourbridge is a market town located in the Metropolitan Borough of Dudley, West Midlands. The town is home to two colleges and between approximately 11:30am and 1:30pm on weekdays, the town centre is visited by several hundred students during their lunch break. This offered an opportunity to target the research to a particular age demographic, though all age groups were included in the research.

The main testing site (Site One) encompassed the Stourbridge Clock Tower area, a pedestrianised public space of approximately 1,600m² in Stourbridge town centre. A number of shops and businesses are located around the perimeter of the site, including a fast-food restaurant, a café and two clothing retailers, along with the entrance to the Crown Shopping Centre. The site contains three closed-top litter bins. All three conditions ('beacons', 'other' and 'control') were tested at Site One over a total of 18 hours.

Site Two encompassed Ryemarket Square, a public space of approximately 1,060m², located approximately 240 metres away from Site One. Shops located around the perimeter of Ryemarket Square include a café, a clothing retailer and a pharmacy, along with the entrance to the Ryemarket Shopping Centre. The site contains four small closed-top litter bins. Site Two acted as a control site for the research, so the site was cleansed to a Grade A standard as with Site One, but no litter was planted for the duration of the experiment.

Behavioural observations were conducted at both sites simultaneously, followed by litter monitoring. The research was conducted during lunchtime hours when the town centre tends to be busiest and when people are more likely to consume and dispose of food and drinks packaging, thereby increasing the likelihood of overall waste disposal incidents.

Stoke Newington High Street, Hackney

Stoke Newington High Street is a busy high street that runs through Stoke Newington in the London Borough of Hackney. The street forms part of the A10, an arterial road that

runs from London Bridge to King's Lynn in Norfolk. The section of Stoke Newington High Street included in the research runs from its intersection with Evering Road in the south, to Garnham Street in the north (approximately 550 metres in length). This site was selected due to its high footfall at all times of day and numerous retail outlets, including many take-away retail outlets that produce disposable packaging. Due to its large size, only the eastern side of the street was included in the research. Three 50-metre testing sites were selected from this section of street, with a 200-metre buffer zone between each. This allowed the three conditions to be tested simultaneously. Sites were selected to be comparable in terms of the types of shops present and physical environment, with each containing at least one litter bin (all were an open top litter bin design).

These were:

- Site One: between Victorian Road and Batley Road (two litter bins present)
- Site Two: between Tyssen Road and Manley Court (one litter bin present)
- Site Three: between Stoke Newington Church Street and Garnham Street (one litter bin present).

The research was again conducted during lunchtime hours when people at the site were more likely to be consuming and disposing of food and drinks packaging. The research was conducted across six days, giving a total of 12 hours of behavioural observations per condition; 36 hours of behavioural observations overall.

SELECTING AND PLANTING 'BEACONS' AND 'OTHER' LITTER

Keep Britain Tidy and partners collected items of rubbish and separated these into 'beacons' and 'other' types of litter. The 'beacons' litter comprised brightly coloured and larger items of rubbish, such as drinks containers, crisp packets, chicken boxes and sandwich packs. The 'other' litter comprised smaller, less salient items such as transport tickets, cellophane wrapping, foil wrapping, tissues and drink bottle caps. Examples are shown in Figure 1. Each item of litter was marked discretely with a small black sticker to differentiate it from litter dropped by visitors to the sites during the testing.



Figure 1: Photograph showing sample of 'beacons' and 'other' litter

At the beginning of each testing session, once the site had been cleansed to a Grade A standard, 25 items of either 'beacons' or 'other' litter were planted throughout the site, with one piece placed approximately every two metres. The litter was planted in such a way as to make it appear authentic, e.g. by distributing it unevenly across the site and placing some items on top of or wedged into street furniture. Where required, items of litter were weighed down with pebbles or fastened with adhesive tack to ensure they stay in place. Figure 2 below shows some of these litter items planted at the test sites.

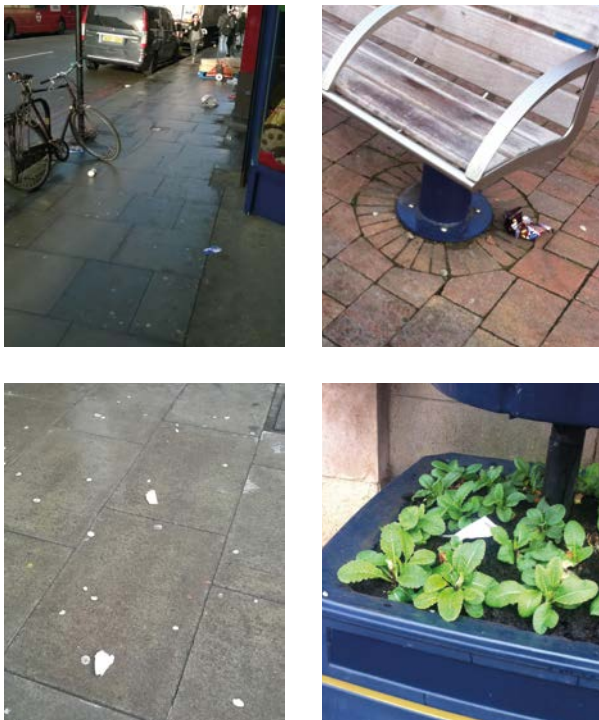


Figure 2: Photographs showing 'beacons' and 'other' litter planted at the sites

MONITORING AND EVALUATION

Behavioural observations and litter counts were conducted during each testing session in order to monitor people's waste disposal behaviours at the sites and the amount and type of litter dropped. Following the experiment, Keep Britain Tidy conducted interviews with project managers and street cleansing staff to gain feedback and insight into the potential implementation of cleansing routines that focus predominantly on certain types of litter. The monitoring and evaluation methodology of the experiment are detailed below.

Behavioural observations

Behavioural observations aimed to identify the impacts of the presence of 'beacons' and 'other' litter items on disposal behaviours. Structured naturalistic (unobtrusive) observations were conducted using pre-coded recording forms to identify instances of disposal behaviours at each experiment site. 72 hours of observations were conducted in total:

- Stourbridge – 18 hours of observations at Site One (six hours for each 'beacons', 'other' and 'control' condition) and an additional 18 hours of observations under the 'control' condition conducted at Site Two.
- Stoke Newington High Street – 36 hours of observations (12 hours per 'beacons', 'other' and 'control' condition).

Quantitative data analysis was conducted using Microsoft Excel. The findings of the analysis were cross-checked with the partners' interpretation of the monitoring results (as identified during the partner interviews) and reviewed through internal workshops.

Where appropriate, findings were tested for statistical significance using a 95% probability. All results presented in this report are statistically significant, unless otherwise specified.

Litter monitoring

Litter monitoring aimed to identify the impacts on the accumulation of litter, as well as the types of litter dropped, at each of the sites.

Following each observation session, litter on the ground at each of the sites was collected, counted, categorised and recorded according to its type, branding and whether it could be classified as a 'beacons' or 'other' item of litter. Planted litter (identified by a black sticker) was not recorded. The litter monitoring was conducted by Keep Britain Tidy and the partner organisations.

Quantitative data analysis was conducted

using Microsoft Excel. The findings of the analysis were cross-checked with the partners' interpretation of the monitoring results (as identified during the partner interviews) and reviewed through internal workshops.

Partner interviews

Interviews aimed to gain partner feedback on the experiment as well as partner interpretations of results and to identify how cleansing routines could potentially be adjusted for maximum effectiveness and efficiency.

These were in-depth, semi-structured telephone interviews conducted with project managers and cleansing staff at the two partner organisations. This was carried out by Keep Britain Tidy on completion of the experiment.

NVivo software was used to conduct qualitative data analysis. The findings of this analysis were reviewed through internal workshops.

PUBLIC RELATIONS AND MEDIA COVERAGE

Keep Britain Tidy and partners did not promote the experiment and, while it was not expected that the experiment would attract media attention, a media briefing document was sent to all partners, detailing 'lines to take' in this eventuality. As such, local residents and visitors were not alerted to the fact that the experiments were taking place. This ensured that the results were accurate and unbiased.

Limitations of the research

As with all experiments conducted in the field, certain variables in the research could not be controlled. Weather, time of year and the demographic of visitors to the sites were all external factors that could potentially have influenced the results of the experiment.

One limitation specific to the current research was the high winds that, in some cases, blew litter away from the experiment sites or gathered items in certain areas of the sites. In order to ensure the amount of litter at the sites remained consistent, pebbles and adhesive tack were used to secure planted litter to the ground. However, it is possible that the number of litter items planted at the sites did not remain consistent throughout the monitoring periods.

The cold temperatures and wet weather during November and December may also have influenced the results of the experiment. If the experiment was repeated during warmer temperatures it is likely that more people would have been handling waste items outdoors and so rates of littering may be altered.

Disposal behaviours recorded during

observation monitoring may have benefited from being more detailed. Recording disposal behaviours such as 'put item in pocket' or 'put item in bag' would have provided a more detailed overview of the types of non-littering behaviours carried out by site visitors.

As the experiment was tested across three different conditions ('beacons', 'other' and 'control'), it is unlikely that the sample of each condition was matched in terms of size and demographics. However, this is something that is not possible to control when conducting a field experiment such as this, and it is argued that the sites tested were comparable in terms of user type.

The time spent observing disposal behaviours during each of the three conditions was different at the two sites. With six hours observing each of the 'beacons' and 'other' conditions and 24 hours observing the 'control' condition in Stourbridge and 12 hours spent observing each of the three conditions in Stoke Newington High Street.

The impact of 'beacons of litter' on littering rates was not statistically significant at the Stourbridge site. It may therefore be the case that more monitoring sessions than was carried out at Stourbridge are required to observe a significant effect of the presence of 'beacons of litter'.

RESULTS AND FINDINGS

Objective One: To identify the impacts on rates of littering and littering behaviours

This section discusses rates of littering under the 'beacons', 'other' and 'control' conditions at the two partner locations.

Overall, the behavioural observations recorded 1,627 (688 in Stoke Newington High Street and 939 in Stourbridge) incidents of people depositing waste items, either in a bin or as litter on the ground. The behavioural observations only recorded people who were seen depositing a waste item and did not count the total number of people at the sites.

Treatment of cigarette butts

Of these waste items, 571 (or just over a third) were cigarette butts (69% of which were littered). Previous research (Keep Britain Tidy, 2012) has found that people treat cigarette butts differently to other types of waste, and many people who would not normally litter other items will litter cigarettes. This suggests that the presence or absence of 'beacons' or 'other' litter at a site is unlikely to influence cigarette disposal behaviours. Additionally, the disposal of cigarette butts can be significantly

more frequent than other waste types and analysing this together with all other waste types is likely to skew the results. For these reasons, cigarette disposal has been excluded from the analysis presented in this report. With this data excluded, all results presented in this report are based on 1,056 (449 in Stoke Newington High Street and 607 in Stourbridge) observations of people depositing 1,135 items of waste.

Impact on overall rates of littering

Table 1 below shows the number of people observed depositing waste items under each condition (in brackets) and the percentage of these who littered. These results show that the largest percentage of people (as a proportion of all people observed disposing waste items) littered under the ‘beacons’ condition in both locations.

This was followed by the ‘other’ and ‘control’ conditions, respectively. The results suggest that the influence of ‘beacons’ on littering becomes less marked where rates of littering are already relatively low, however further research is required to verify and understand this effect.

A chi-square test of independence was carried out to compare the frequency of littering and binning under each of the three conditions. The test is applied when you have two categorical variables from a single population. It is used to determine whether there is a significant association between the two variables. A significant interaction was found ($\chi^2(2) = 41.13$, $p < 0.001$), suggesting that littering was more likely to occur under the ‘beacons’ condition (35%) compared to the ‘other’ (22%) and ‘control’ (17%) conditions.

Table 1: Proportion of people who littered under each condition			
Testing condition	Stoke Newington High Street	Stourbridge	Overall
Beacons	59% (199)	12% (200)	35% (399)
Other	41% (133)	11% (217)	22% (350)
Control	30% (117)	9% (190)	17% (307)

Accumulation of litter at the sites

Litter counts conducted at the end of each monitoring session, shown in Table 2, support the behavioural observation findings. These show a similar trend, in that the highest accumulation of litter was found under the ‘beacons’ condition at the Stoke Newington High Street location. However, it is suggested that these figures are treated with caution, as it cannot be fully known which litter items were dropped at the site and which had been blown onto the site by wind.

Table 2: Counts of litter accumulated at the sites during the testing sessions under each condition			
Testing condition	Stoke Newington High Street	Stourbridge	Overall
Beacons	160	82	242
Other	115	85	200
Control	77	55	132

Impact on rates of littering by gender

Overall, males were more likely to litter than females across all three conditions. Littering was observed to be the highest in the ‘beacons’ condition for both males and females, followed by the ‘other’ and ‘control’ conditions respectively.

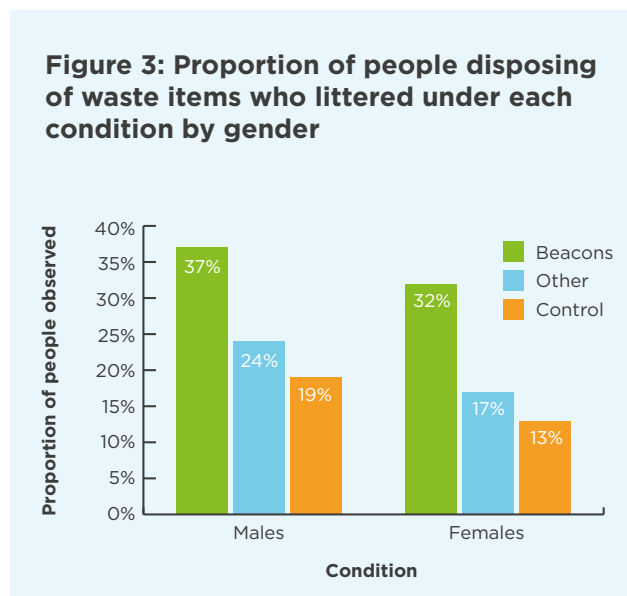
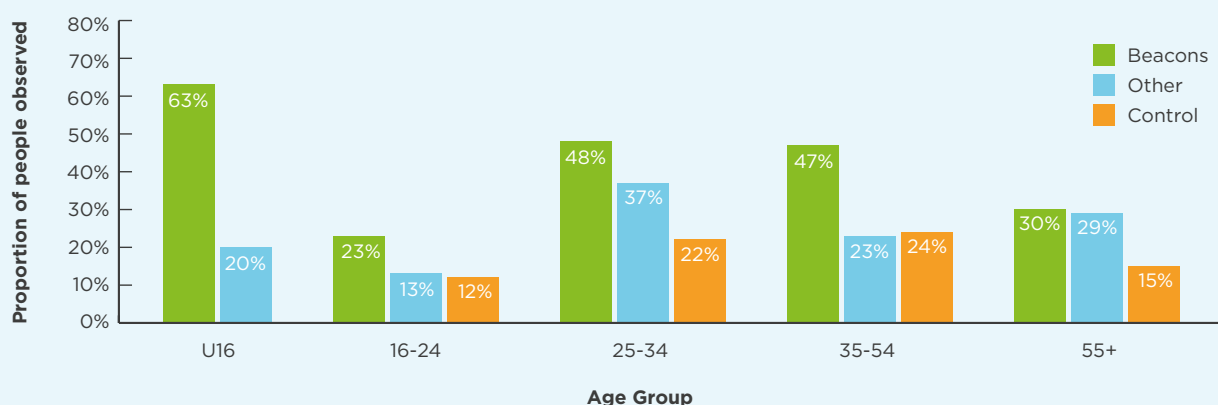


Figure 4: Proportion of people disposing of waste items who littered under each condition, by age group



Impact on rates of littering by age group

Within the ‘beacons’ condition, it was under-16s who were found to be the most prevalent litterers, with littering accounting for 63% of all observed disposals in this age group. This represented a 43% increase when compared to littering observed during the ‘other’ condition. However, these findings are based on a very small sample of under-16s (13), which may decrease their reliability considerably.

With the exception of this age group, it was 35–54 year olds for whom the presence of ‘beacons’ of litter most significantly impacted on littering behaviour.

Littering in this age group increased by 24% during the ‘beacons’ condition compared to in the ‘other’ condition and by 23% when compared with the ‘control’ condition, as shown in Figure 4. These results should be treated with caution, as the researchers who conducted the observations were required to estimate the age group of each person they observed and recorded. There is a possibility that in some cases the age group selected for an individual was incorrect; however, this is unlikely to have a significant impact on the data.

Impact on rates of littering when accompanied by others

Previous research (Bateson et al., 2015; Ernest-Jones et al., 2011) has often suggested that the presence of other people (in the same group) can influence waste disposal behaviour; unaccompanied individuals have been found to be less likely to litter their waste than those who are accompanied by two or three others.

It is interesting to note that this trend was not observed within the current research, with rates of littering highest in people who were alone, compared with those in groups of two or three (Table 3).

Table 3: Proportion of people who littered by group size

Number of people in group	Proportion of people of littered
Individual	27%
Two people	19%
Three people	23%
Four or more people	32%

Figure 5: Proportion of people disposing of waste items who littered, by group size and under the three conditions



Figure 5 explores rates of littering by the different group sizes under each of the three conditions. The results suggest that the presence of ‘beacons’ or ‘other’ litter may influence disposal behaviours among people who are alone or in groups of two or three, but this influence appears to diminish, particularly under the ‘beacons’ conditions, among groups of four or more. However, due to the varying sample sizes in each group size category, this finding should be treated with caution.

Objective Two: To identify the impacts on the type of litter dropped

The second objective of the research was to identify the impact of the presence of ‘beacons’ and ‘other’ litter on the type of litter that was subsequently dropped at the target locations. These findings are outlined below.

Impacts on disposal of ‘beacons’ and ‘other’ litter types

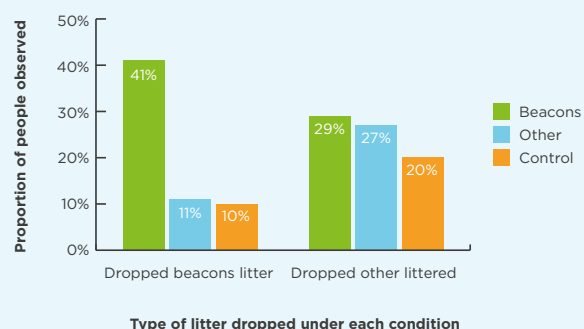
The number of people who littered a ‘beacons’ item, rather than place it in a bin, was observed across the three conditions. As displayed in Figure 6 below, people were more likely to litter a ‘beacons’ item under the ‘beacons’ condition (41% of those depositing a beacons item littered it, rather than place it in a bin) compared to rates of ‘beacons’ littering under the ‘other’ and ‘control’ conditions (11% and 10% littered, respectively). The littering of ‘other’ items remained fairly constant across the three conditions. These findings indicate that the presence of ‘beacons’ litter may have a normative influence on people’s disposal behaviours by influencing perceptions of how people typically behave at a site.

To support this, a chi-square test was then carried out to compare the frequency of littered and binned ‘beacons’ items under each of the three conditions.

A significant interaction was found ($\chi^2(2) = 55.81, p < 0.001$) suggesting that littering of ‘beacons’ items was more likely to occur under the beacons condition (41%) compared to the other (11%) and control (10%) conditions.

The visibility of ‘beacons’ litter therefore appears to prompt others (either consciously or subconsciously) to do the same with their ‘beacons’ items. This finding builds on previous research (Cialdini et al., 1990; Dur and Vollaard, 2013) which has found that the presence of litter has a normative influence on people’s littering behaviours. Moreover, it suggests that the presence of ‘beacons’ items in an area increases the likelihood that further ‘beacons’ litter will accumulate.

Figure 6: Proportion of people who littered ‘beacons’ and ‘other’ items under the three conditions



In assessing the impact on individual litter types, as outlined in Table 4 below, it is interesting to note that the littering of drinks containers (e.g. plastic bottles; coffee cups) rose drastically under the ‘beacons’ condition (54) compared to under the ‘other’ (1) and control conditions (1). In most cases, drinks containers can be classified as ‘beacons of litter’, as they are fairly large and are often brightly coloured or branded.

Although to a lesser extent, this trend was also observed for food packaging and utensils, food and general litter, with instances of littering for these item types increasing with the presence of ‘beacons’ of litter.

Item Type	‘Beacons’	‘Other’	Control’
Drinks containers	54	1	1
Food packaging and utensils	24	13	11
Food	18	13	4
General litter (all other waste)	15	11	6
Paper	11	19	14
Cellophane wrapping	10	14	9
Gum	4	0	3
Plastic bags	3	1	2
Unknown	2	4	4
Total	141	76	54

Objective Three: To identify how cleansing routines can be adjusted for maximum effectiveness and efficiency

Semi-structured telephone interviews were conducted with project managers and cleansing staff at the two partner organisations. Interviews aimed to gain feedback on the experiment as well as identify how current cleansing routines could potentially be adjusted for maximum effectiveness and efficiency. Results from these are outlined below.

Partner feedback on the experiment

Overall, the project was well received by partners. Largely, the general observations of street cleansing teams and project managers were supportive of the findings outlined in this report. Partners agreed with the findings, in that ‘beacons’ items were seen to attract more

litter than ‘other’ litter items.

Cans and branded products stood out quite a bit. Branded stuff does seem to attract lots more litter.

Partners reported to be pleased with the relationship with Keep Britain Tidy, and with the feedback that was provided on completion of the analysis and throughout the project. The partnership was suggested to be well organised and the experiment was said to be easy and convenient to implement.

The guys on the ground enjoyed doing it.

Partner perceptions of a ‘beacons’ focused cleansing routine

Partners were asked to comment on their perceptions of the results, as well as their thoughts on the hypothetical ‘beacons’ focused cleansing regime below.

A full site cleanse will be conducted at the beginning of each day, followed by sweeps throughout the day that focus only on ‘beacons’ litter, leaving ‘other’ litter on the ground. A full clean will then take place at the end of the day and early the following morning to ensure statutory cleansing requirements are met.

Partners suggested that a ‘beacons’ focused street cleansing regime would potentially mean that more ground could be covered within the same time frame. Partners expressed interest in the key findings and the potential positive impacts that could be generated. For example, one partner suggested that a cleansing routine such as this would allow areas further away from the city centre to be reached and cleansed more frequently. Another partner was particularly interested in how the insights could be applied to tackling night-time economy littering and alcoholic drinks litter.

We would be interested to discuss with you how we could use it [a ‘beacons’ focused regime].

We would be interested in using it for night-time economy and alcoholic drinks litter.

You would be covering more ground more quickly so you could clean a larger area with less staff in a shorter space of time.

At the moment residential streets are swept twice a week. Potentially if they had more time they could litter pick some streets three or four times a week and still do full sweeps as well.

However, partners also highlighted a number of potential challenges to implementing a ‘beacons’ focused street cleansing regime.

A key barrier was perceived to be difficulties in overcoming the deep-rooted/ingrained attitudes and working styles of cleansing staff, who are very familiar with the litter patterns of their areas and have consistently cleansed the main retail and commercial sites to a Grade A standard. Often, current regimes have already been refined to generate the most impact within the time and resources available. In addition, a 'beacons' focused cleansing regime would be very difficult for those cleansing operatives conducting a manual cleanse, with a barrow and brooms, etc., as well as mechanical sweepers, as it would be easier and therefore more cost-effective for them to sweep all litter. In these situations, amending to a 'beacons' focused regime would be unlikely.

It would be a big change for our staff to say 'you need leave things down'.

If you have a broom in your hand and you are sweeping a whole pavement you would pick up cigarette butts ('other' litter) at the same time.

Even though we would not be giving more work, and we would be covering more ground, it's still a big change.

Similarly, it was felt that there could be a backlash from local residents and councillors if some litter items, albeit smaller/less salient items, were being left on the ground. One partner further explained that the public tends to expect local areas to be cleansed to a Grade A standard, and may require some persuasion for this type of cleansing regime to be fully accepted. However, since a 'beacons' focused cleansing regime would be expected to reduce the overall amount of litter on the ground, and allow for a wider area to be cleansed, it could be suggested that the perceived prominence of litter in the target areas would decrease.

Residents and councillors demand their roads reach Grade A standard.

Councillors might have complaints if the area is not clean.

Finally, although there was interest from partners in the potential of a 'beacons' focused cleansing routine, ultimately a larger evidence base would be required to enable local land managers to consider significant or permanent changes to cleansing routines.

Replicating this experiment across other locations and/or trialling a 'beacons' focused cleansing regime as a further experiment would be beneficial.

We would need more than just this as an evidence base to change the way we work.

If you ran it [the experiment] at other sites... that would give us a bigger picture.

CONCLUSION

The experiment's findings appear to support previous research that suggests people to be more likely to litter in areas where litter is already present. The findings also suggest that the presence of large, more salient items of litter (e.g. branded or brightly coloured items) might further increase the likelihood of additional litter being dropped, although this observation needs further testing as it was statistically significant at only one of the two sites. The presence of 'beacons of litter' have also shown to be more likely to attract the littering of additional 'beacons' items, more so than 'other' items of litter, which further exacerbates the issue.

If the initial indications from this experiment are supported by subsequent work, we could say with confidence that cleansing routines that focused on the removal of 'beacons' items will 1) allow cleansing staff to move more quickly through sites, potentially covering more sites per day and 2) decrease overall rates of littering in the area.

RECOMMENDATIONS

The findings of the experiment indicate that reducing the amount of 'beacons' litter on the ground works to decrease the amount of litter subsequently dropped. However, Keep Britain Tidy believes that further evidence to fully understand the impact of 'beacons' litter on rates of littering is required before we could fully conclude the impact on the ground. As such, the overarching recommendation is to conduct a further experiment that tests a 'beacons' focused street cleansing regime and evaluates whether this would provide a low-cost practical solution to reducing rates of litter overall.

A series of practical recommendations for those wishing to replicate this experiment is outlined below:

- If possible, conduct the experiment during the summer months, when footfall is higher and a larger number of people can therefore be observed depositing waste items.
- In order to test the true impact of the experiment, partners should not alert residents/users of the area to the fact that the experiment is taking place. As such, partners should not promote the experiment in any way.

- Ensure that planted litter items will withstand weather conditions and remain at the testing site throughout the monitoring period. (E.g. items can be weighed down using pebbles or stuck to surfaces using sticky tack, etc.).
- Ensure that the number of hours spent observing each of the three conditions is the same across all three conditions and across all areas if multiple areas are selected.
- During observations, record additional behaviours such as ‘put item in bag’ and ‘put item in pocket’ in the monitoring of disposal behaviours. These were not recorded in the current experiment and would have provided a more accurate representation of disposal behaviour.

Things to consider for any additional experiments that trial and monitor a ‘beacons’ focused cleansing regime:

- Drinks bottles are likely to accumulate more quickly than any other litter type. It is therefore recommended that these items should be prioritised for cleansing.
- Provide thorough training for cleansing teams, fully defining what is meant by ‘beacons’ and ‘other’ litter items. This will ensure maximum engagement with the change in routine and help to ensure consistency in cleansing practice.
- Work to engage local residents and councillors with the benefits of a ‘beacons’ focused cleansing routine.
- Main retail and commercial sites are the priority areas for ‘beacons’ focused cleansing regimes as they are the areas with high footfall and high prevalence of litter.
- Where a beacons focused regime is trialled, look to understand how best ‘other’ litter items can be dealt with in this area (e.g. full cleanses at certain times of the day) to prevent accumulation of this litter type.

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LITTER AND SOCIAL PRACTICES

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INTRODUCTION

People have strong feelings about litter as it affects their views about the place they live. Removing litter is expensive and accounts for about £1 billion per year of public expenditure (HoC CLGC, 2015). This estimate does not include litter on land outside the control of municipalities nor does it include the vast quantity of litter that is never collected and becomes integrated with soils and seas.

According to the environmental charity Keep Britain Tidy, while only 28% of people admit to it, in fact around 62% of people have dropped litter (Keep Britain Tidy, 2013: 4). The real figures for litter deposition are probably even higher if unintentional or unknowing instances of littering are included, such as dropping a receipt or a morsel of food consumed 'on the go'.

This paper aims to provide a clearer conceptualisation by offering a new typology of litter (including marine litter), based around the ever-changing social practices that lead to its formation (Table 1). This typology is used to structure a review of the literature on prevalence and impacts of litter including its cumulative and single impacts and its environmental and human impacts. This new organisation of the literature on litter and the introduction of the social practices theory of change offer new insights into what kinds of approaches might be used to address the problem.

The paper draws from and updates the authors' previous work, including an evidence review commissioned by Defra, on ways of tackling low standards in local environmental quality (Davoudi and Brooks, 2012) and a think piece arguing for social justice in policy on littering (Brooks and Davoudi, 2013). We conclude with some reflections on the contribution that could be made to litter policy by theories of social and societal change, suggesting in particular that more attention is paid to the promotion of wider pro-environmental attitudes as part of tackling littering and a greater consideration of social justice.

TYPES OF LITTER, THEIR PREVALENCE AND IMPACT

What is litter?

The Environmental Protection Act 1990 (s.87) defines litter as "anything that is dropped, thrown, left or deposited that causes defacement, in a public place". This includes a wide range of items such as smoking-related litter (cigarette ends and packaging), chewing gum, food and drink litter (especially fast-food packaging), drug-related litter (such as used syringes), carrier bags and faeces (especially dog fouling). Without stretching the definition, we can include within this category a type of litter that is only beginning to gain public awareness – personal hygiene items, such as cotton buds, unthinkingly disposed of through the sewerage system, then accumulating as litter in marine areas.

Largely excluded from this definition, however, are other kinds of ‘environmental incivility’ such as fly-tipping (the illegal deposit of larger items of waste, ranging from black-bag waste through to large-scale dumping of industrial materials), addressed under s.33 of the Environmental Protection Act), as well as fly-posting and graffiti. These problems are nevertheless touched upon in the subsection below on the cumulative impacts of litter in combination with other environmental blights.

The research on littering and its remedies is patchy, with some categories (for example, those of reputational and economic concern to industries) far better represented than others (for example, dog fouling). Much research dates from an early era of consumer packaging and waste in the 1970s and 1980s, prior to the

rise in today’s most prevalent forms of littering. Those phenomena at the edge of our concept of littering, such as marine accumulations of litter that has entered the fluvial system or personal hygiene products flushed through the sewerage system, have only recently come onto the research agenda.

It is possible to break down litter in a variety of typologies, some of the most obvious being based on location (e.g. town centre, roadside, countryside and rivers), type of material (e.g. paper, plastics and organic), biodegradability and toxicity.

The typology used in this paper, and shown in Table 1, broadly situates litter according to its main (or major) associated social practices, each of which has its own material infrastructure,

Table 1: A typology of litter and its related social practices

Type of litter	Examples	Social practices
Waste food	Dropped and abandoned food and drink	Eating ‘on the go’ (seated out of doors or in a vehicle, walking)
Food packaging	Fish and chip wrappers, polystyrene foam boxes and cups, plastic bottles, glass bottles, coffee containers	Buying food from fast-food outlets to be consumed ‘on the go’ (seated out of doors or in a vehicle, walking)
General packaging	Carrier bags, polythene wrappers, paper bags, cardboard boxes, polypropylene straps, polystyrene filling, rubber bands	Opening/accessing/using various goods and printed materials ‘on the go’.
Waste printed ticketing	ATM receipts, train and bus tickets, parking permits, betting slips	Issuing records of commercial transactions taking place outside the home of which the validity or usefulness is time-limited
Waste printed information	Flyers, newspapers, magazines	Distributing and/or consuming printed materials ‘on the go’
Cigarette waste	Cellophane wrappers, boxes, cigarettes, cigarette stubs	Cigarette smoking on threshold or in vicinity of work and leisure premises, partly due to the indoor smoking ban
Chewing gum waste	Adhesive gum, gum wrappers	Consuming gum for breath-freshening, oral hygiene or confectionery, used as an accompaniment to outdoor activities
Dog waste	Dog fouling and discarded dog waste bags	Dog walking in public places, letting dogs run off the leash (out of an owner’s sight), wishing to clear, but not to carry, waste.
Drug-related waste	Used syringes, drug residue on foils	Consuming drugs with fellow users, in parks or derelict/abandoned spaces
Personal hygiene-related waste	Cotton buds, feminine hygiene products, prophylactic devices	Using sewerage system as a disposal chute for personal hygiene products
Miscellaneous	Lost or abandoned property, discarded garden/waste	Dropping clothing, deliberately disposing of items unsuitable for household waste collections, disorderly or street lifestyles, criminal activity.

Sources: Davoudi and Brooks (2012); INCPEN (2014); authors’ own typology and additions

cultural associations, range of participating agents, and interaction with wider social changes – for example, longer journeys to work and widening of participation in the labour force.

In order to fully appreciate the social practices and policy implications of the typology of litter, discussed in the final section of this paper, it is worth first considering the prevalence and impacts of each litter type identified in Table 1. The main research evidence for this is explored below.

Prevalence and impacts of litter

The effects of littering can broadly be divided into single and cumulative, and further subdivided into human and environmental impacts. While there will clearly be overlaps, it is helpful to look at each category in turn.

Human impacts

The human impacts of littering are probably better appreciated than their environmental counterparts. Although awareness of the environment has increased considerably over the past four or five decades, information programmes about litter impacts are only just beginning to target people's concern for the wider environment (e.g. Wiltshire Wildlife Trust, 2008) rather than being purely focused on issues around human wellbeing. The following section explores the research evidence on the human impacts for those types of litter outlined in Table 1 where research evidence has been identified.

Waste food: Research on the impact of food as litter links it with the attraction of scavengers that present a danger to human communities, in particular as carriers of diseases. A rising threat comes from airborne scavengers, such as gulls, that have been shown to gain health and breeding advantages from littered food (Stiegerwald et al., 2015) and contribute risks of contamination of surfaces and swimming waters with bacteria harmful to humans through their faeces (Reagan et al., 2012). Anecdotally, they may also graduate from litter forays to target food held by people eating out of doors (Horton, 2016).

Food packaging: Of all types of litter, food and drink packaging is the one that has grown at the fastest rate in many countries (Roper and Parker, 2013). Over the first decade of the Keep Britain Tidy surveys to 2011, its prevalence increased by 20% (Keep Britain Tidy, 2012a: 45).

The INCPEN survey (2014) found that food packaging and food made up 16% of total litter in its survey sites, and of that the largest component was made up by litter from confectionery.

The same survey, counting drinks-related items separately, found that non-alcoholic drinks-related items made up 9% of recorded litter, while 2% was accounted for by alcoholic drinks related items (INCPEN, 2014).

Residues of food on packaging can attract scavengers, as noted above, while cumulatively, food packaging contributes to an impression of neglect that can attract other kinds of blight. This area of littering is of interest not only to academics concerned with waste, but, in its branded form, to those concerned with marketing and the impact of discarded packaging on brand perceptions. There is some evidence that seeing clearly-branded packaging discarded as litter can detract from people's perceptions of the brand (Roper and Parker, 2006; Roper and Parker, 2013; Keep Britain Tidy, 2013: 11).

General packaging. This includes packaging for miscellaneous items that are not comestibles or cigarette-related and includes waste arising from the transport and storage of materials such as cardboard boxes, polystyrene filler and polypropylene strapping. Perhaps the most prevalent form of packaging litter is represented by the carrier bag, generally of a lightness that means it is easily transported by the elements, into both countryside (HoC CLGC, 2015: 9) and water systems. As such, it can be hazardous to animals and wildlife.

Cigarette-related litter. The INCPEN survey echoes the ENCAMS (now known as Keep Britain Tidy) on-the-ground surveys of local environmental quality, showing that cigarette-related litter, at 35.2%, is the most prevalent kind in England and has been since the survey began in 2001/2. While cigarette litter actually declined in 2008, which was the year after the indoor smoking ban came into force (Keep Britain Tidy, 2012b), this was a blip coinciding with a campaign that year against cigarette litter, and in subsequent years there were strong rises. It is safe to conclude that the laws against smoking in public indoor environments have increased the prevalence of litter from smoking. This fits with the experience from countries that have had the ban for longer, such as Australia, Scotland, Ireland and America.

Cigarette stubs are buoyant and easily enter water systems, leading to accumulations in beaches and coastal areas, where cigarette litter makes up around 28% of items (Schneider

et al., 2011). Besides being unsightly, cigarette litter has been proven harmful to natural organisms (see section on Environmental Impacts).

Chewing gum waste: According to an annual survey, chewing gum is the second most prevalent form of litter in England, making up 26% of litter (INCPEN, 2014). Chewing gum litter is predominantly made up of staining and solid gum, rather than gum wrappers, which account for only 1.3% of all litter (INCPEN, 2014).

The main research on gum as litter comes from organisations concerned with local environmental quality, such as INCPEN and Keep Britain Tidy. The latter found that 95% of Britain's streets are stained by chewing gum. The gum is made from sweetened synthetic rubber and does not biodegrade. It has been estimated by a coalition of councils that each piece of gum costs around 10p to remove (Gammel, 2006). Besides causing the aesthetic blight of a grimy appearance, the gum can adhere to and damage shoes, clothes and hair. Prevalence of littering gum may be related to an apparently widespread attitude that gum (along with dog waste) is not really a type of litter (Brook Lyndhurst, 2012).

Dog waste: While this kind of waste comes low on INCPEN's list of the most frequent kinds of litter, at only 1.3% of litter items in its surveyed sites, it is certainly one of the most noticed and offensive forms of littering, and one of the highest sources complaints to local MPs and councils (Keep Britain Tidy, 2012b).

Dog fouling is both a slip hazard and a potential source of 'toxocara canis' (roundworm) infection. Children between two and four years of age are at the greatest risk of infection because of playing in outdoor spaces and more frequent tumbles and falls. While fewer than ten newly diagnosed cases were reported to the UK Centre for Infections per year (Atensteadt and Jones, 2011), once infected, impacts are significant, ranging from fever to loss of visual acuity (ocular syndrome).

For fear of such consequences, dog excrement may discourage people from using outdoor areas for the purpose of exercise, to the detriment of their physical health (Atensteadt and Jones, 2011).

Drugs-related litter: While a relative newcomer to the UK's litter mix (Philipp, 1993), drugs-related waste has been on the increase since 2001 and is an increasing matter of concern for UK local authorities (Blenkharn, 2008; Blake Stephenson, 2010), reflecting public anxiety about needle stick disease transmission, with

children considered to be particularly at risk. This concern caused drugs-related litter to be viewed by the public as "most important for spend" of all types of litter (and irrespective of whether it was actually perceived as a significant problem locally) in a major survey (Keep Britain Tidy, 2009: 18).

Intravenous drug use is widely-known to carry a high risk of hepatitis B, hepatitis C and HIV. Respective rates of infection among those injecting illegal drugs in Montreal, Canada, were found to be 48%, 65% and 16% respectively (Papenburg et al., 2008). Blood-borne viruses have been shown to have the capacity to survive in discarded needles (Thompson et al., 2003; Nyiri et al., 2004), although disease transmission is low: a major study of 'Community-acquired needle stick injury' recorded no incidence of transmission of disease (Papenburg et al., 2008), results that supported many previous smaller studies in Europe, the US and South Africa (Papenburg et al., 2008: 489). The authors nevertheless stress while no incident of transmission arose in their study, the risk remains between 1 and 2% for each virus and there are a number of well-attested cases where infection has been passed on in this way. The main impacts of drug-related litter are the costs of medical investigations as well as the fear induced by needle stick injury, along with a small risk of contracting a life-altering illness.

Environmental impacts

Although somewhat behind other environmental threats such as air pollution and industrial contamination of the ground and water supply, the consequences of littering for the environment are rising up the research agenda. In particular the impacts of litter on marine life are increasingly understood.

Many of the types of litter that originate on land eventually find their way into the water system and seas through processes such as run-off and the sewerage system (MSFD, 2013).

Cigarette-related litter: Cigarette stubs are the most common component of this litter, tending either to accumulate where deposited or to wash through to other areas via gutters, culverts, drainage and sewerage systems. Studies are beginning to show their harmful impact on the environment, including being a source of metal leachate that can cause acute harm to local organisms (Moerman and Potts, 2012). Metals from smoking tobacco such as arsenic, cadmium and toluene get trapped in the filters and then wash into the water system (Smith and Novotny, 2011; Rath et al., 2012).

A study found that just one cigarette stub suspended in a litre of water killed half the fish exposed within (Slaughter et al., 2011). Marah and Novotny (2011) report many other studies that establish cigarette stubs' toxicity.

The cellulose acetate material used to make cigarette filters is non-biodegradable and buoyant, meaning it is easily washed away from the litter source, to become a common source of beach litter – a study by the Ocean Conservancy NGO reports that filters are the most common item found in beach clean-ups each year (cited in Novotny et al., 2009). The accumulated weight of global filters deposited each year has been estimated at over 750,000 metric tonnes (Smith and Novotny, 2011). It therefore comes as something of a surprise that companies are not obligated to use this material: solutions such as biodegradable filters have been piloted and rejected by the industry. Smith and Novotny (2011) note that filters are not the safety measure most smokers assume them to be, and may even be responsible for a rise in certain types of cancer resulting from smoking. Yet they appear to be nothing more than a marketing tool.

Plastics: The most tangible evidence of litter in the oceans is from accumulations of plastics, arriving into the oceans in various and complex ways (Galgani, 2015). It is estimated that between 4.8 and 12.7 million tonnes of plastics enter marine waters annually (Galgani, 2015). Plastics, particularly when eroded to micro particles, can resemble food to sea creatures; their impact on marine organisms includes disruption to the organisms' digestive systems, including plastics' ability to absorb and transport endocrine-disrupting toxins; the accumulation of plastics in organisms; and transfer through the food web.

Accumulation occurs not only in the 'oceanic gyres' or systems of circular ocean currents, which can trap plastics in extensive clusters that show up on satellite imagery, but on the coastal and beach areas where ocean currents deposit their litter loads. At the deep sea level, there is a wide variation between the different oceans of the world, with Indian and Atlantic oceans estimated to have around 500 plastic items on the seabed per km², while lower levels are found in the Arctic and Antarctic oceans – one study estimated the former at under 40 items per km² (Pham et al., cited in Galgani, 2015). The identification of areas of concentrated litter deposit and perhaps the existence of 'deep sea gyres' is, however, yet to be established. At coastal level, the concentrations are markedly higher, around 725 items per km².

Plastics in the seas are gradually broken down

due to wind and wave action and interaction with biological organisms, in particular through accumulations of microbes living on their surfaces. Microbes can break down plastics into micro-particles, which can be measured in the sea. At an even smaller level, nano-particles are thought to be pervasive, although there is a need to develop detection methods to improve the evidence in this area (Pham et al., cited in Galgani, 2015).

Plastic debris in the ocean carries broader eco-system risks, through generating 'rafting' opportunities for invasive species, including ones toxic to human health. In terms of marine life, one of the most injurious aspects is through ingestion, particularly of microplastics, which takes place all levels, from that of plankton, though birds and fish species up to marine mammals. The presence of plastics is harmful both due to its adverse impacts on digestion and on the tendency of plastic surfaces to accumulate other chemicals in the seas that disrupt the endocrine system and affect viability of some species' populations (Teuten et al., 2009).

Cotton buds: Evidence is accumulating of the clustering of cotton buds on beach areas, particularly under certain seasonal and tidal conditions (Poeta et al., 2016). These are washed out of the sewerage system where they have been inappropriately disposed. Campaigns to move to biodegradable materials in the stems of such items are gaining ground, as in Johnson & Johnson's recent move to paper stems (Smillie, 2017) but even with paper, rather than plastic, stems, they will still represent another burden on marine areas.

Cumulative impacts

In terms of cumulative impacts, several research studies show links between the deposition of one kind of litter to the accumulation of multiple types of litter and additional 'environmental incivilities' (Ellaway et al., 2009), including fly-tipping, fly-posting, graffiti and vandalism. These problems run along a scale of gravity from creating a visual blight to representing a health hazard and instigating a spiral of decline.

The mechanisms of cumulative impact work in several ways. At the most basic level, litter may attract more litter, a phenomenon that has been described as 'litter-on-litter' syndrome (Cialdini et al., 1990; Krauss et al., 1996). Furthermore vermin and disease may be attracted by litter and rubbish and they may drive people, business and investment away (ODPM, 2002: 11-12; see also Keep Britain Tidy, 2013: 14). As global warming continues, the attested 'urban

heat island effect', whereby high ambient temperatures are both concentrated and prolonged in built-up areas, has the potential to exacerbate litter-origin vermin and disease.

At a higher level is the so-called 'broken windows' effect, which, as its name suggests, pertains to empty and derelict buildings. The theory was introduced by Wilson and Kelling in 1982 and its implications developed by other authors (see for example Cohen, 2000). It proposes that once empty or derelict buildings, litter, fly-tipping and vandalism take hold, they can attract anti-social, illegal and unhealthy behaviours. There is growing research evidence for this connection (Keizer et al., 2008; Brook Lyndhurst, 2012; Keep Britain Tidy, 2014: 27).

More subtly, litter and its attendant 'environmental incivilities' would appear to have a negative impact on people's mental health. Ellaway et al. (2009) found that people who perceived high levels of problems with litter, graffiti, dumped cars/fridges, broken glass, and uneven pavements were more than twice as likely to report frequent anxiety and depression than those who perceived low levels of these problems. Another study has identified a link with people's general sense of security: "Members of the public, who are satisfied with how their area looks, are significantly more likely to be satisfied with how safe they feel in their area" (Keep Britain Tidy, 2009). These negative cumulative impacts of litter do not affect us all in the same way. For example, older people who feel less able to defend themselves and those who spend a lot of time in the local area will be particularly afflicted (Bowling et al., 2006; Mottus et al., 2012).

A final cumulative impact is when the incidence of littering is added to the already-challenging conditions experienced by those living in deprived communities, with lower levels of income, employment and qualifications.

The 2013/14 Local Environmental Quality Survey notes that the percentage of sites with litter levels graded unacceptable increases from 3% in the least deprived to 28% in the most deprived areas (Keep Britain Tidy, 2014). Studies have shown that not only is litter worse in deprived than in better-off areas, but it is perceived to be worse (ENCAMS, 2009; Hastings et al., 2009). Littering may also be of higher concern to people in deprived areas (Burrows and Rhodes, 1998; SDRN, 2004:19).

While it is useful to understand these cumulative impacts, it remains important to distinguish between different types of litter, as each will have different causes and different solutions.

LITTER, SOCIAL PRACTICES AND POLICY IMPLICATIONS

The theory of social practices (Reckwitz, 2002; Shove et al., 2012) has been usefully applied to a wide range of policy issues, from obesity to energy demand. It foregrounds how tightly interwoven our social problems are with our infrastructures, governance and ways of life. In doing so, it points the way to systems-thinking approaches to what changes are needed to shift these problems. The social practices approach indicated in column three of Table 1 raises two important points for this review. First, it makes it clear that the nature of littering is ever-changing and its origins are multiple. It is affected by factors including alterations in lifestyle, in the law, in corporate packaging practice and in digital technologies, working in interaction with each other. Second, the incidence of littering is, in the main part, connected with the life we live on the move, out of doors or in vehicles, whether through choice or obligation (the latter increasingly the case for people who smoke cigarettes or are homeless; but also, as in the case of commuting, influenced by factors as diverse as urban design and housing costs).

With regard to the first point, changing social practices due to new legislation include more smoking out of doors, near offices and leisure venues, based on the indoor smoking ban. This interacts with the corporate packaging decision not to use biodegradable filters, alluded to above, to create a new and significant source of terrestrial and coastal littering.

Corporate packaging decisions affecting littering also include the coastal/marine blight of plastic cotton bud stems, which could helpfully be alleviated by wider adoption of paper stems. But this would not in itself be a problem if some sewerage outlets did not end up in the fluvial and marine system, and if the practice of inappropriate disposal of personal hygiene items in the sewerage system were not widespread.

Similarly, the problem with chewing gum seems to have been made worse by new ways of selling gum without individual foil or paper wrappers for each piece, in combination with the apparently widespread attitude that gum is not really a type of litter. In the case of waste-printed ticketing, technological advances may be expected to alleviate the problem, by issuing digital versions of tickets that create no waste. It should not be forgotten, however, that the increased reliance of electrical devices for all aspects of life has its own non-negligible implications for carbon emissions.

This insight into the highly systemic and interwoven nature of litter causality can be contrasted with policy interventions to combat littering, which, although varied and inventive, are largely based on a linear model of causality, and an implicit ‘closed systems’ theory of policy impacts, whereby one or more independent variables (corporate practice, individual behaviour, legal penalties etc.) are manipulated to generate positive change in the dependent variable of interest, littering. Social systems are, however, open and complex systems where changes to any element have multifarious downstream effects, some of which are predictable, some of which are not.

Most literature on littering shows some recognition of the range of agents that play a role in creating and alleviating the problem, ranging from individuals to communities, retailers, NGOs, local authorities, law courts and up to multinational corporations and governments (Brooks and Davoudi, 2013). Each nation appears to target its anti-littering interventions to a particular set of actors. In current UK policy, there is a strong emphasis on getting individuals to take responsibility for their anti-social behaviour in creating the blight and to change their behaviour, for example, through fixed-penalty notices and Community Protection Notices (CPNs), while in countries such as France and Australia, there is greater pressure on industry to develop more environmentally friendly packaging, through legislative and advisory means.

The review of Local Environmental Quality from which this paper draws (Davoudi and Brooks, 2012) gives referenced examples of many such interventions along the continuum of responsibility. Showing the limitations of the ‘linear’ policy approach, many such strategies, including the campaign accompanying the indoor smoking ban mentioned earlier, and the Australian Packaging Covenant (APC, 2015; APC 2017), have been shown to exhibit short-term success and long-term plateauing or retrenchment.

In contrast to the linear approach, a ‘systems thinking’ approach would suggest at the very least joining up policies on waste with those promoting environmental awareness and behaviours, to all agents from corporations and governments down to individuals. Littering mitigation then becomes a part of a move towards a ‘greener’ social policy that supports organisations and people to show their care for where they live by investing in the quality of their local environment. They can bring this about not just by taking actions to alleviate littering, but by joining in efforts to maintain

local and wider environments as places that are healthy for people and for wildlife. A useful by-product of this approach is that it can then give greater prominence to environmental issues that are currently ‘out of sight and out of mind’ such as marine littering.

With regard to the second insight of the social practices approach, that littering is a consequence of the life lived out of doors, a helpful link can be made here with the main demographic attributes associated with littering – youth and low income (Davoudi and Brooks, 2012). In terms of resources and the relative impacts of penalties, these are groups that can safely be described as vulnerable. They are also a group less likely to have private transport options, at least as regards the vast majority of the population who live in urban or peri-urban areas. The people who throw litter from a vehicle are usually far away from the scene before their offence can be noticed or recorded. It is those who go on foot who are most likely to be observed in the act of littering and issued with fixed penalty notices and CPNs.

In this regard, there is much to be gained by linking the policies that punish littering and resource environmental cleansing with the social justice dimension that is operative in many other policy areas. At their worst, by penalising the weakest actors in the littering spectrum with regressive fines such as fixed-penalty notices and by placing them in the ambit of the criminal justice system through CPNs (breach of which can be a criminal offence) current policies have the potential to further marginalise the vulnerable groups most likely to litter and beyond this, may bring even bring into question the fairness of the justice system.

The polarisation of wealth that is occurring across Europe and the US looks unlikely to diminish in the short term, as jobs continue to be removed from the economy through digitisation and the excess pool of labour allows continued casualisation of employment through such means as zero-hour contracts and ‘contractor’ business models such as that of Uber. Whatever the pressures on funding-squeezed authorities to raise revenues to support compliance with environmental legislation, the association between youth, low income and littering behaviour argues against blanket penalties such as fixed-penalty notices. It also argues for increased sensitivity in campaign message design, so that exhortations to take responsibility for the quality of the local environment do not result in further stigmatisation of heavily littered areas (likely to be deprived communities) as places where ‘they do not care’.

This article has presented no more than a glancing consideration of the potential of one contemporary theory of social change, the social practices theory, to shed light on some directions in which policy might be developed to better address causes and remedies for littering. The intention is, through indicating the value of applying social change theories to this area of policy, to stimulate further contributions in the field.

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A CASE STUDY ON THE REPURPOSE PROJECT: A LONDON ESTATE-BASED PILOT TACKLING FLY-TIPPING THROUGH REUSE

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THE CASE STUDY

The EU-funded pilot Repurpose programme (2014-7), managed by Groundwork London in partnership with the London Community Reuse Network and Middlesex University, has taken a new approach to the problem of fly-tipping. It ran five pilots across London on housing estates varying in nature and size. On each estate, redundant spaces were turned into reuse hubs to collect, repair and sell reusable fly-tipped items. These were collected from the estate alongside items collected directly from householders. The activities have been complemented by an in-depth community behaviour change programme to encourage positive waste behaviours. Additionally, each reuse hub offered training and volunteering opportunities for residents.

This paper provides a case study report on the Repurpose project, an innovative programme that has sought to address the issue of fly-tipping on housing estates through a resident engagement programme and reuse service. It provides data on the success of the programme in encouraging reuse and avoiding fly-tipping and some preliminary results on its effect and its impact on the attitudes of residents to the disposal of unwanted items.

BACKGROUND

In England in 2015/16 local authorities dealt with nearly 936,000 incidents of fly-tipping (Defra, 2017). Just over two thirds of these incidents involved household waste. Local authority land, such as estates, car parks, parks and open spaces, were the second most popular sites for dumping after highways (Defra, 2017).

The costs of dealing with fly-tipping, particularly of bulky waste, are increasing. It cost nearly £50 million in 2015/16 in England (Defra, 2017).

Not only is this fly-tipping expensive to clear up, it also blights the experience of the local environment for residents. In England, 62% of the public surveyed cited the 'appearance of the local area' as important to them when asked about issues affecting local and global environments (Keep Britain Tidy, 2012); in Scotland, almost a third of adults felt that rubbish or litter lying around was 'a common neighbourhood problem' (Scottish Government, 2016) and in Northern Ireland 'rubbish lying around' was cited as a significant problem by 26% (Department of Justice, 2015).

Figure 1 shows some of the fly-tipped items found on the Pembury Estate, Hackney, and on the White City Estate in the Borough of Hammersmith and Fulham.



Figure 1: Fly-tipping on the Pembury Estate, Hackney, and on the White City Estate in Hammersmith and Fulham

Many fly-tipped items are reusable: for bulky waste items collected at the kerbside, 24% were estimated to be reusable in their current condition, rising to 40% including items requiring slight repair (WRAP, 2012). An assessment from flats in the London Borough of Tower Hamlets indicated that around 33% of bulky waste presented for collection could be reused (WRAP, 2014). There is an estimated £400 million of untapped value from household waste material that ends up in landfill each year (Local Government Association, 2014).

While most councils offer bulky waste collection services and have household amenity sites where residents can dispose of unwanted bulky waste items, often residents on estates are not able to use these facilities. Either they are not eligible for a collection or do not have the means to transport items to amenity sites or to a place for collection. In addition, the system on estates where bulky waste teams clean up fly-tipping very quickly (sometimes within four hours) means that some residents don't realise fly-tipping is a problem.

As a result, despite repeated efforts to engage residents, fly-tipping of bulky waste remains high on housing estates.

Meanwhile, many housing estates have residents who are unemployed and have little activity to occupy them during the day and who would benefit from using their skills and engaging in activities in a non-pressurised setting. In addition there are often low-income residents who could benefit from low-cost furniture provision, particularly those that are temporarily housed.

THE REPURPOSE PROGRAMME

Repurpose was a three-year pilot programme (2014-7) co-financed by the European Commission's LIFE+ programme, with match funding provided by Groundwork London and local partners. LIFE+ is the European Commission's financial instrument supporting the implementation, updating and development of EU environmental policy and legislation by co-financing pilot or demonstration projects with European added value (European Commission). It was managed and delivered by Groundwork London, a community charity that brings people and the environment together in local action. The London Community Reuse Network (LCRN), which champions community-based solutions for waste prevention, recycling and reuse across the capital, has provided support on embedding the project longer term into waste management practices. Expert behaviour change support and academic analysis of survey results has been provided by Professor Tom Dickens of Middlesex University.

The overall aims of Repurpose were to engage residents of five housing estates to: reduce fly-tipping of reusable items on the estates by 25%; increase reuse in target estates by 25%; and increase the capacity and skills of resident communities. Underneath the overall objectives were a number of specific targets including establishing five reuse hubs; engaging 850 households running 50 behaviour change events; and working with 50 volunteers and training 50 residents and 25 housing professionals.

Project locations

The project was carried out on five pilot estates (see Figure 2) which were spread throughout London and vary in scale. There were two large estates: the Grahame Park Estate in Barnet and the White City Estate in Hammersmith, which have approximately 2,000 households each. There were two

medium-sized estates: the Andover Estate in Islington and the Pembury Estate in Hackney, with approximately 800 households; and one smaller estate, the Samuel Lewis Trust (SLT) Estate in Lambeth with just 250 households. On each estate, redundant space was transformed into a reuse hub called The Loop.



Figure 2: Location of the reuse hubs/ the Loops

Main programme activities

The activities of the Repurpose programme on each estate covered five broad strands. First, the **creation of a repair and reuse hub** in an under-used space from which to undertake small repairs and upcycling and make items available for residents to purchase at low cost. The space and service was branded as 'The Loop' locally. One example of a before and after is provided by the Grahame Park reuse hub in Figure 3.



Figure 3: The Grahame Park reuse hub, before and after

Second, **launching and delivering a doorstep reuse collection service**, as well as sourcing items from fly-tipping locations (see Figure 4).



Figure 4: Collecting fly-tipped items by trolley

Third, **creating training and volunteering opportunities for local people**, ensuring residents develop long-term skills (Figure 5).



Figure 5: Volunteers on the Pembury and Samuel Lewis Trust Estates

Fourth, **engaging residents via events and activities** to develop long-lasting behaviour change (See Figure 6).



Figure 6: Working with residents on the Andover Estate

Lastly, working with estate staff to incorporate reuse and fly-tipping reduction into estate policies, contracts and staff job descriptions.

EVALUATION AND MONITORING OF PROGRAMME

The programme has been monitored throughout as a key part of its deliverables.

One of the first activities on site was a face-to-face survey with estate residents, with answers recorded immediately on iPads. This survey was carried out by Groundwork London staff and sought to establish residents' attitudes to fly-tipping, reuse and recycling, as well as their knowledge of existing nearby waste facilities and their interest in using an onsite reuse service. The survey was carried out with just less than 20% of residents of the estates (1,064 respondents) in July and August 2015. The residents were, to some degree, self-selecting as they were chosen at random via door-knocking and stopping people on the street and those that were willing to answer were recorded.

This survey was recently repeated in December 2016 and January 2017 (490 respondents) and the results are currently being analysed by Middlesex University to see whether there has been any change in attitudes to fly-tipping, reuse and recycling over the project period and whether this change could be ascribed to interaction with the Loop. In addition, a follow-up survey has asked questions to see what additional benefits local people have gained from interaction with the Loop's service.

A bespoke online database was created using Zoho Creator, (a low-grade app development platform that enables the launch of custom, mobile-ready apps) in August 2015 so that all items of furniture collected could be recorded systematically and the ongoing performance of each site could be monitored. Each item of furniture collected was assigned a number and the database records: where it had been sourced from, either fly-tipped, collected or donated; what repair, if any, was needed to it, and finally what happened to the item following repair or cleaning of it, whether it was sold, donated or moved to another location. The Furniture Reuse Network (FRN) average weights list was used to calculate the approximate weight of items and CO² saved by diverting these items for reuse. The list allocates an average weight to each item that can be used to estimate the weight of each item.

Lastly, a baseline fly-tipping survey was carried out in October and November 2015 as the onsite estate services began. Local staff walked round each estate every day for two weeks recording all the fly-tipped items they came across each day. From the total, the number of potentially reusable items was

recorded based on a visual assessment. This was also stored on the Zoho database and again weights and CO² impact were assigned based on FRN averages. This survey was repeated every five weeks throughout the project to elicit whether there had been any recognisable reduction in fly-tipping over the duration of the project and whether the overall aim of a reduction in fly-tipping of 25% had been achieved.

FINDINGS

The EU-funded on-site delivery of the programme ended on 31 March 2017 and most of the key numerical objectives have been fulfilled, with the focus now on final delivery, evaluation and dissemination of results. The data collected supports anecdotal evidence that the programme has been successful in engaging residents and encouraging reuse, but reducing fly-tipping by 25% (a target set as a part of the funding bid) has been more challenging to assess.

The main objectives and results in detail are below:

Increasing reuse by 25%

All of the estates had a collection and repair service on site from October 2015. The hubs collected 6,582 items by the start of January 2017, exceeding the target set by the programme of 1,500 items by over 4 times. This removed an estimated 94.3 tonnes of bulky waste items from the waste stream. Of the items, 27% required minor repairs to make them usable. The hubs refurbished and sold on 3,490 items to local residents at affordable prices through sales at events, at pop-up shops and via retail areas in the hubs.

The initial survey found that residents on the whole did not take advantage of borough reuse schemes. For example 70% of residents had not heard of their local bulky waste service and 60% had not heard of their local household waste site. There was no active reuse programme on site before Repurpose started, so any reuse that was happening was off the estate or informally facilitated between friends and neighbours. The programme can therefore be seen as having succeeded in increasing reuse.

Initial findings of the second survey show that 82% of those engaged with the project are concerned about reusable items going to waste compared to 45% who hadn't been engaged. Of those that have engaged with Repurpose, 68% report they 'reuse more, throw fewer items away, fly-tip less or recycle more' as a result of their engagement.

Reducing fly-tipping by 25%

The baseline survey of items fly-tipped over a two-week period showed that 1,018 items had been fly-tipped on the five pilot estates (weighing just over 17 tonnes). Five-weekly fly-tipping data shows more of an impact on fly-tipping was made through the programme on some estates than on others. For example, on the Pembury Estate, the number of fly-tipped items fell from an average of 113.5 items over the first three months (November 2015 to January 2016) to an average of 77.6 items in the three months between October 2016 and January 2017.

This indicates a reduction of 32% before taking into account seasonal differences. Peabody staff who manage the estate have also reported reductions in bulky waste costs. Andover Estate shows a similar reduction, whereas White City Estate shows almost no perceptible change.

The Samuel Lewis Trust Estate's own monitoring of bulky waste data shows a 16% reduction in weight over the period. However, to really assess effectiveness of the programme in reducing fly-tipping, these reductions would need to be compared to a 'do nothing' scenario to see whether fly-tipped and bulky waste would have increased or decreased anyway over this period. This is hard to achieve as each estate has such unique circumstances and many variables. Two of the estates (Pembury and Grahame Park) are undergoing large regeneration programmes, increasing the volumes of residents leaving and arriving on site, which we know can lead to more bulky items being disposed of.

In the Repurpose baseline behaviour change survey, carried out in summer 2015, fly-tipping was deemed to be an issue for residents: 74% of residents agreed there was a lot of fly-tipping in their neighbourhood and 55% thought it had an impact on the environment. However, 36% considered fly-tipping as 'normal behaviour as most people do it' and 38% didn't think it was a problem as 'someone clears it up'.

Initial findings of the second behaviour change survey show that when comparing those that have engaged or heard of the Repurpose programme to a random sample of residents, those engaged with Repurpose claim they are much less likely to fly-tip and more likely to reuse: for example only 9% of residents who have engaged with Repurpose would 'put a reusable item outside' if they no longer wanted it compared to 21% of residents who hadn't engaged. As one resident on the White City estate put it:

What kind of impact has the Loop had in the local community, if any? A significant impact. People regularly arrange collections for The Loop instead of just dumping their items. The Loop gets tip-offs and people report items to The Loop which are all reusable. The Loop is also a reference point for recycling and informing people about the correct way to get rid of their unwanted items, for example I didn't know there was an electronic items recycling point until The Loop told me.

Increasing capacity and skills of residents

A total of 2,262 residents were engaged in the reuse programme, well in excess of the target of 850. All of the estates offered an events and behaviour change programme since July 2015. There were 104 events across the estates. These included swap shops, give-and-take events, reuse craft activities, visits to local waste sorting sites, schools workshops and activities and skills workshops. All these activities helped increase the capacity and skills of residents.

All the estates developed a volunteering programme which increased skills for these residents. This ranged from the Grahame Park Estate where 16 volunteers contributed regularly and the project had no capacity to accommodate further volunteers, while in White City and the Pembury Estates, volunteers were involved for defined periods. Five residents were employed on the programme. The total number of regular volunteers involved was 39, while 86 further volunteers were involved irregularly (compared to a target of 50).

Evaluation of the work with volunteers has shown that not only has the programme increased their skills but has had a social impact on their lives. For example, one volunteer on the Grahame Park Estate said:

I had a nervous breakdown six years ago and I couldn't leave my house. When I started to get better I started coming here and it has changed me so much: eight months ago I wouldn't be able to speak to you as I couldn't focus at all and I would have been too intimidated.

I have been volunteering here for eight months and was the first volunteer on the project. In the beginning it was very scary for me to even be around other people and I felt lost, so being involved in the start of the project worked really well as it wasn't too busy. Slowly, slowly, I started working

with Jodie [previous reuse coordinator], which gave me a lot of confidence. The work at the beginning was painting and I am a painter/decorator by trade, so I already had many of the skills required. So that for me was perfect.

The timing of opening of the shop was perfect. I was slowly building up confidence and then I started getting to know everybody. I come here whenever I can, whenever I feel well enough. This work for me is like a meditation. It makes me feel good that I am doing something for the community. And it is no pressure. Although I am using my skills I feel that if I was in a paid position now I wouldn't be able to cope with the pressure.

I am giving everything I have to The Loop. I can't see that I could do any other type of volunteering. The Loop for me was like a Godsend – I live just next door. It feels like the opportunity was sent to fit me perfectly. I will never be able to give back what I have got out of volunteering here already.

The social impact of having a dedicated on-estate presence and service has been much higher than we anticipated. The reuse hubs became a social hub on each estate, providing day-time activity and a means for residents to interact with each other. As a resident on White City put it:

What kind of impact has the Loop had in the local community, if any?

A significant impact. It has led to conversations about reuse. It has impacted attitudes towards the local environment and impacted relationships amongst each other in White City.

It has provided a real meeting place in the community for new relationships; I have met many people through the Loop. It has strengthened my ties with White City community.

It is totally on the streets and is visible and tangible. It engages the entire community and has become prominent. It has bought lots of new things to the estate. It is 'out-there'.

Do you think the Loop has made a difference in changing residents' behaviour towards reuse/fly-tipping/the local environment?

Absolutely, 100%. I know people who have changed their behaviour because of The Loop's existence.

The school event addresses the throwaway culture our children grow up in through changing the children's attitudes and teaching them other ways.

CHALLENGES

There are a number of challenges to carrying out a programme of this kind. The pilot estates, as are typical of many estates in London, have considerable areas that are only accessible by foot and many blocks have no lifts. This meant that the process of carrying out a collection service is complex and time-consuming. A service of this kind is also working at odds with the signals being sent out by the bulky waste collection teams, whose very presence and service can be seen as encouraging the dumping of items. While work has gone on with these teams to look at their practices, most waste contracts are multi-year in length and practices are hard to alter part-way through. While individual caretakers assisted the reuse service and promoted it to residents, there has been no wholesale change to estate-wide bulky-waste service practices to date.

The size of an estate affects the ability of the service to provide a 'closed loop' in terms of reusable items. Samuel Lewis Trust Estate has just 250 households. While residents on the estate adopted the practice of donating to the service and the hub provided valuable volunteering opportunities, there have simply not been enough residents requiring items to provide an outlet for the items collected. As a result the programme needed to operate as a network and items were taken from Samuel Lewis Trust Estate to Grahame Park Estate where there was more demand for items.

Potentially reusable items need storing and adequate space for retail, which is often not forthcoming on estate boundaries. Containers were placed on site to provide workshop, shop and storage space on Samuel Lewis Trust Estate and the only available space on the White City Estate were four separate small storage undercrofts scattered around the estate. The logistics of moving items between these spaces limited the service's capacity.

The last main challenge was the high turnover of residents, which not only generates large amounts of bulky waste and fly-tipping in stages when empty properties are cleared and new tenants and landlords dispose of unwanted furniture, but also means any service needs to be promoted regularly to engage arriving residents.

CONCLUSIONS

The programme has been broadly successful in reaching its objectives in that all our measurable targets were met, but some of the overall objectives, in particular an absolute reduction in fly-tipping, are harder to assess confidently on all estates with the evaluation measures used.

In practice, Repurpose has been a huge success in setting up active reuse hubs on each estate, engaging residents in reuse and encouraging residents to donate rather than dump reusable items. This is evidenced by the volume of items that have been processed, far in excess of the original aims. In addition, these hubs have become extremely valuable parts of the community, providing multiple social benefits to complement the clear environmental benefits gained.

The EU-funding for programme delivery ended on 31 March 2017. Groundwork London is currently negotiating the longer term legacy for each programme on the estates. Despite the challenges identified above, the numerous social and environmental impacts of the programme mean that a service of some kind is continuing on each of the estates beyond this date. Interest in running similar programmes has been shown by a number of separate housing associations and local authorities that attended masterclasses on the programme in January and February 2017.

Further evaluation of results will take place and an implementation guide and toolkit detailing how to run a similar programme have been published. All documents are available on www.repurpose.london.

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EDUCATING ON LITTER IN SCHOOLS

Dr Morgan Phillips was head of Eco-Schools England from 2013 - 2016. Eco-Schools is the world's largest environmental education programme operated by Keep Britain Tidy and now running in more than 60 countries. He delivered multiple talks and workshops, worked with local authorities, government departments, SMEs, large and small NGOs, multinational businesses and lots and lots of children.

Emily Holt is the Education and Engagement Officer (Recycle for Your Community) at Keep Britain Tidy. Emily has been working in the environmental education sector since 2010 and has worked with a range of ages from 18 months to 18 years. Emily has also gained a diploma in SEN support and is very keen on ensuring inclusivity and giving every child access to outdoor learning. She was awarded her London Environmental Educators' Forum (LEEF) Fellowship at the Royal Parks Foundation Education Centre on 12 July 2016.

Making the case for education on litter and wider environmental issues is a challenge with today's crowded curriculum. This article explores what 'litter education' actually involves, what it does and what it can do for pupils. In doing so, it makes the case for litter education in schools.

One approach to litter education is through the Eco-Schools programme, which provides a seven-step framework for schools to follow, based around nine sustainable development education topic areas. With more than 18,000 schools involved and 2.3 million children actively engaged, Eco-Schools inspires a whole-school approach that empowers children and young adults to improve the environment (Eco-Schools, 2017a). Here we explore some of the ways in different schools are using litter education to do more than simply raise awareness of litter as an issue:

DEVELOPING AN UNDERSTANDING OF THE ISSUE

Litter education work typically begins with baseline monitoring of the litter situation in the school grounds. Pupils come together as an eco-committee and conduct a simple survey of litter in their playground.

At a bare minimum, they will record the volume of litter, note the different types of materials littered and identify hotspot locations; they might also observe and record

who is responsible for dropping litter and at what times of day.

The model used in schools varies greatly depending on the age and ability of the pupils. The topic of litter provides links to the National Curriculum (2014).

Every state-funded school must offer a curriculum which is balanced and broadly based and ... which prepares pupils at the school for the opportunities, responsibilities and experiences of later life.

The Eco-Coordinators at Bretforton First School decided that a great way of gaining whole-school involvement in the Eco-Schools programme was to set challenges for the classes that linked with the National Curriculum. This included surveying the school grounds for litter. Eco-Coordinators Jane Neal and Jo Ellis found success with this approach (NAEE, 2014):

This is the third year that we have set Eco Challenges, and we are delighted with the way that we have been able to embed the nine Eco-Schools Topics into the curriculum. All pupils are enthused when working on the challenges, and tackle the real-life situations with a purpose.

Completing an initial survey of their school grounds allows pupils to have a set of real data that they can compare to later on to assess progress. Through using litter as a topic, the teaching on materials, persuasive writing, data and monitoring are all put into perspective, helping pupils to learn these skills for later life.

PLANNING TO TACKLE THE PROBLEM AND MONITOR SUCCESS

Having gained an understanding of exactly how much litter there is and an idea of where the litter is coming from, the eco-committee will create an action plan filled with the practical steps they will take to address the problem. The eco-committee will then begin an anti-litter campaign with some communications.

This often involves a whole-school assembly to explain the issues and outline the plan. Resources are then sought out and procured – everything from new litter, compost and recycling bins, to litter pickers, posters, stickers and badges. Case studies on the Eco-Schools website reveal the sorts of activities that eco-committees usually undertake (Eco-Schools, 2017a). For example, they might assign student litter monitors, put up anti-litter posters, do regular litter picks or even beautify the school grounds by planting flowers or painting walls so that they become a nicer place to be and therefore an environment worth protecting.

To judge the success of the chosen activities, the eco-committee will monitor changes in the volumes of litter by repeating the baseline survey at regular intervals. The hope is that, over time, the litter situation improves to the point that better waste behaviours become the norm. The eco-committee can then tone down the anti-litter work and focus on the next sustainability issue.

The eco-committee at Bewsey Lodge Primary noticed an increase in litter after the school opened their healthy tuck shop. The pupils discussed in their next meeting how they could combat this issue and encourage other pupils to care for their school grounds. One part of the action taken was to have a different group of pupils litter-pick every day. The amount of litter collected is logged and counted up weekly. The weekly data is recorded in their Eco-Schools monitoring book. The pupils came up with and acted upon many ideas of how to change pupils' perception of litter and the ongoing recording of data allowed them to monitor changes over time (The Big Tidy Up, 2017).

REFLECTING ON LEARNING

Whatever the outcome, it is important to reflect not only on whether the litter situation has improved, but also on what has been learned by pupils. What pupils learn depends hugely on the educative skills of the eco-coordinator. Dr Chris Gayford (WWF, 2010), researcher of sustainable environmental education, describes learning for sustainability like this:

Learning for sustainability is the process of developing the knowledge, skills, values and attitudes needed to move from where we are now to a state of sustainability.

Litter is complex issue and can be explored via a range of subjects and aspects of the curriculum. A year 6 pupil at Dr Radcliffe's Church of England Primary School wrote a play with an anti-littering message. This play was performed by the pupils for the rest of the school, helping others to understand the link between human behaviour and our global environment (Dr Radcliffe's Church of England Primary School, 2017).

DEVELOPING WIDER SKILL SETS

Eco-Schools have to monitor the progress of their activities. The pupils can monitor the litter topic through repeating their baseline survey and through observing other pupils' behaviours and attitudes towards litter. They will evaluate the findings to determine if their litter project has created the desired results in school. Through the complex nature of the topic, pupils should come to learn that many interactions and interdependencies are at play. In doing this, they develop not only their knowledge, but systems thinking skills that will help them to understand not only why littering occurs in their school but how it links to other sustainability topics such as climate change and broader topics they might encounter in biology, geography, maths and physics.

The eco-committee at Kingsmead Primary School noticed that the wind had blown a lot of litter into their school grounds and wanted the school to take responsibility for clearing litter, even if it wasn't their own. They designed a whole-school litter project and added a tree on the wall of each classroom. Every time a child picked up a piece of litter, they added a leaf to their classes' tree and the class with the most leaves each week won the school Green Flag. This pupil-led idea has improved confidence of pupils and led to further environmental ideas in school (Eco-Schools, 2017b).

Having learned about the causes and consequences of the litter problem in their school, the pupils then have a chance to develop their creative, lateral and rational thinking skills as they come up with ideas for activities that might solve the problem. Turning ideas into an action plan will help pupils develop even more skills, for example, project management, collaboration, budgeting, research, ICT, planning and design. Carrying out of the plan is likely to involve the development of another set of skills, for example, negotiation, marketing, public speaking, leadership and diplomacy, not to mention hard skills such as operating simple mechanical devices (litter pickers), carrying heavy objects, putting up posters, cleaning, turning compost, sorting waste, planting seeds and digging. All of this should help develop dexterity and be useful later life, so long as they keep up the practice.

BEYOND KNOWLEDGE, UNDERSTANDING AND SKILLS

Some of the skills gained involve positive values and attitudes and some relate to the pupils becoming active citizens. These are outlined below:

Developing positive values and attitudes:

What else is learned? It is worth returning to Dr Chris Gayford's exploration of learning for sustainability here. He goes on to say:

It is important to note that learning which simply develops knowledge, understanding and skills is not enough. The values that learners attach to this knowledge, and their attitudes to applying these skills are of huge importance. Learning about sustainability in ways that do not address values and attitudes is not considered either learning for sustainability or effective practice. (WWF, 2010)

It is important therefore for eco-coordinators and eco-committees to remain mindful of the values and attitudes that their activities are likely to activate and reinforce in themselves and in the wider school community. For example, an eco-committee may choose to use incentives as a way to persuade fellow pupils to take up pro-environmental behaviours, rewarding them with a chocolate bar if they use the correct bin. But what does the recipient of the chocolate bar learn in this scenario? Is it that using the bin is only worth doing if they get something in return and not worth doing if they do not?

Perhaps an eco-committee might decide that pupils who are caught littering should be made to pick litter during their next lunch break. What is learned in this scenario? Would it lead children to question why anyone would voluntarily engage in a pro-environmental behaviour such as litter picking if it is usually an activity carried out as a punishment for doing wrong?

In designing activities and learning on litter issues, eco-coordinators and eco-committees need to consider the values and attitudes that will be developed. They need to ask themselves whether, for the sake of the environment, social justice and sustainable development, it is more useful to develop values such as care, compassion, empathy, respect, kindness and collaboration, or their opposites. No form of education is value neutral; well-designed education for sustainability can contribute to the development of the values that schools often present as 'core'.

In the summer of 2016, a 'New to English Litter Project' was set up at St Mary's CE Primary School. First, the pupils researched where the most litter was in their school grounds and then they examined what the litter was. The pupils described the litter they were finding using adjectives and created posters to display around the school. This project improved the spoken English of pupils and enthused those involved to take environmental action themselves (St Mary's CE Primary School, 2016).

Developing active citizenship

Litter education in schools provides pupils with an understanding of how to be a good citizen and care for the environment around them. If done correctly the children will take it upon themselves to educate peers and their family.

The Local Environmental Quality Survey for England (LEQSE, 2015) shows that pupils are exposed to 'food-on-the-go' litter when they travel to and from school with a high prevalence of litter adjacent to schools.

Sites adjacent to schools have a significantly higher prevalence of 'food-on-the-go' litter (90%) compared to sites away from schools (78%). Further research is needed to better understand whether consumption of food-on-the-go is higher among school children, or whether it is parents who might be waiting to collect them from school, that are responsible for the littering.

As children are often exposed to litter outside of school, encouraging the pupils in school to care about their school environment and local areas will help to spread the message to the wider school community, in turn improving the condition of our streets. Dr Martha Monroe, of the University of Florida Department of Forest Resources and Conservation says:

Environmental education helps students gain much more than knowledge. They gain skills in making a differences and an intrinsic belief that they can. That confidence and empowerment can spill over into other aspects of their lives. (NAAEE, 2016)

CONCLUSION

If litter is understood by teachers and policy-makers as a topic through which to develop the kind of knowledge and skills outlined above, it is more likely to be given attention in today's crowded curriculum. Those who call for more education as a way to address the litter problems face a need to give schools more reasons to engage their pupils in these issues. Visible improvements to the grounds of a school will be one motivator, the chance to develop knowledge, skills and values that will benefit pupils, the school and wider society will be an even more powerful one.

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STRENGTHENING COMMUNITIES BY REDUCING LITTER

George Monck is the Chief Executive of CleanupUK. CleanupUK is a charity that helps and encourages volunteers to pick up litter in their neighbourhoods. Before starting CleanupUK, George was a management consultant and manager.

It is well documented that litter breeds litter (Cialdini and Reno, 1990, and Dur and Vollaard, 2013). People are generally less inclined to drop litter in places where there is no litter present. It follows, therefore, that keeping your neighbourhood clean will, in itself, help to reduce the chance of further littering.

But why all the fuss? Sure, litter looks unsightly and spoils the aesthetic appearance of a place, but doesn't the problem stop there?

Sadly, it doesn't. And there is plenty of evidence to show that the presence of litter can cast a threatening shadow over a neighbourhood with far-reaching physical and psychological consequences.

Research from Keep Britain Tidy's "How Clean is England?" (2015) shows that the areas with more indicators of deprivation have significantly worse levels of cleanliness than less deprived areas. Areas of higher deprivation were found to suffer more severely from a poor - quality local environment, including litter, graffiti, fly-tipped waste as well as other issues, such as a lack of access to green spaces.

In a 2007 research paper, "The Elements and Prevalence of Fear" (Shepherd and Moore, 2007), litter was positively associated with fear of crime and personal harm. This was followed up by letter to The Times, which held that, "A disfigured environment sends messages that personal disfigurement may be next. Since fear of crime can be as corrosive as crime itself, litter disposal is likely to make us all feel safer." (Shepherd, 2008)

A Scottish study in 2009 showed that people with a perception of high levels of what the authors describe as 'street-level' incivilities (litter, graffiti, dumped cars/fridges, broken glass, uneven pavements) were more than twice as likely to report frequent anxiety and depression than those who perceived low levels of these problems (Ellaway et al., 2009)

WHAT CAN WE DO TO REDUCE LITTER AND STRENGTHEN THOSE COMMUNITIES THAT ARE SO BADLY AFFECTED BY IT?

The response that we at CleanupUK are frequently faced with from residents as we go about our work is: "It's the council's job." Well, yes, cleaning the streets at regular intervals is indeed the council's job and they do a pretty good job of it on the whole. But there is another way to tackle this problem and it is a solution that was supported in research commissioned by Newcastle City Council and carried out by Newcastle University (Davoudi and Brooks, 2012). One of the research paper's proposals was that "the next step in addressing problems such as littering may be to gain greater involvement from people at street level in the upkeep of their neighbourhoods."

This accords very neatly with the work that CleanupUK has been doing in East London over several years on its Beautiful Boroughs Project, working in 11 London boroughs - Barking & Dagenham, Camden, Enfield, Greenwich, Hackney, Haringey, Islington, Newham, Redbridge, Tower Hamlets and Waltham Forest - to help people get together to form groups to keep their local area free of litter, safe and a better place to live.

The project has been all about encouraging and supporting residents to form local litter-picking groups and so not only keeping their neighbourhood clean but also, in line with the multiple research outlined above, helping to strengthen their community and improve the feeling of friendliness and neighbourliness. Figure 1 and Figure 2 provide us with examples of the impact of the Beautiful Boroughs Project in Haringey and Tower Hamlets.

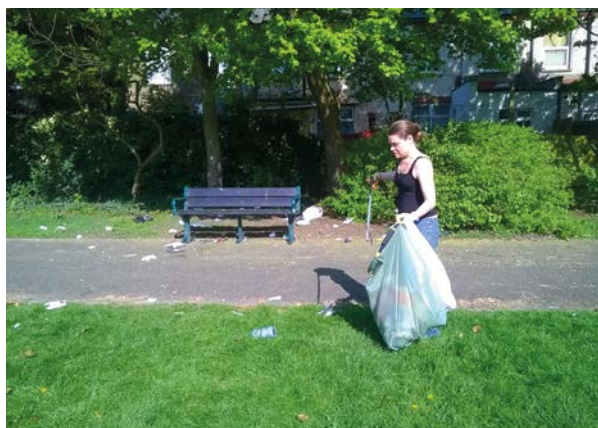


Figure 1: Beautiful Boroughs Project: Noel Park, Haringey, before and after

The feedback that we have received from residents is positive. Some 87% of participants feel that they have now more contact with people in their local community and 92% of feel that their own actions can help to change their community. It feels almost incidental that 89% of residents are now more motivated to pick up litter in their community. And one of the residents commented, “The people I met [on the litter-pick] are very friendly and I now know that there are good people in my area.” We would agree with the conclusion of the Newcastle research that involving people at street level is a very valuable contribution to the solution of the litter problem and to the strengthening of the local community.



Figure 2: Beautiful Boroughs Project: Jamiatul Ummah School, Tower Hamlets

But we still need to convince many residents that keeping their neighbourhood free of litter isn't just the council's job and, more importantly, the residents themselves can benefit from getting together and taking action. One of the barriers to this objective is, certainly, the greater proportion of mobile and transient residents that the Newcastle study refers to. This study also comments that “impacts of the recent welfare reforms are likely to reduce the resources available in the more deprived neighbourhoods for upkeep of the home environs.”

So it isn't going to be plain sailing, especially in view of another excellent study, by the Carnegie Trust (Carnegie Trust, 2012), which suggests that, especially in less affluent areas, an external trigger or spark is often needed to initiate beneficial community action. The one method that we at CleanupUK find works best for engaging people is helping local residents to go round knocking on their fellow residents' doors to ask them to get involved. Such peer-to-peer interaction is vital.

WHERE DOES THAT LEAVE US?

I would argue that all this points towards strong involvement of local residents, complementing the street-cleansing work that councils do. If residents in the more heavily littered areas don't contribute in some way to tackling their local litter problem, it may be that the levels of litter in some neighbourhoods will get seriously out of hand. And I would strongly argue against those who throw up their hands in horror and hold that clearing up other people's litter simply encourages them to drop more. Peer example can, without doubt, influence residents not to drop more litter when they see their fellow residents out there litter-picking.

And one final word from Denmark. The 2012 Keep Britain Tidy conference saw the energetic and inspiring Pelle Guldborg Hansen from Roskilde University explain how the “nudge” principle can help encourage people not to litter. He quoted the World Health Organization, which holds that, if you want to solve problems, you need to work in neighbourhoods. Hansen went on to say that action against litter shouldn’t be seen simply as cleaning up a neighbourhood but as building it up, ideally in partnership with other local initiatives.

In the current economic climate, no one is going to be able to pay for this to happen on a large scale. There may be some help selectively available from local councils and voluntary organisations but it is going to be down mainly to local communities to take the necessary action for themselves.

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