

Experiencing the toxic city: Effects of contamination and its remediation on individuals and communities in urban Australia

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Abstract

There is little research available on individual and community experiences of environmental contamination in Australian urban areas. However, international research suggests that the health impacts for individuals and communities living near contaminated sites are significant and complex and extend beyond the risk of immediate physical harm to impact on the psychological health of both individuals and communities. This paper presents the findings of one component – a resident survey – of a mixed method social research project that seeks to address this research gap. A random telephone survey was conducted in early 2009 with 400 residents living in proximity to the Botany Industrial Park (BIP) and Southlands contaminated sites in the southern suburbs of Sydney. The paper presents the findings from two of the themes that the survey investigates, namely the impact of the contamination on the 'lifescape' of residents living near the site, and the sense of stigma associated with contamination and whether this might be transformed by the remediation process. We suggest that a better understanding of community experiences and responses can inform the future management and remediation of contaminated lands. We hope that improvements in these processes can contribute to the alleviation of potentially negative impacts on people's health and wellbeing.

Introduction

The legislative, regulatory and decision-making frameworks relating to contaminated land in Australia aim to minimise risks and costs and maximise benefits from remediation for all involved including the broader community. Ensuring a 'triple bottom line' outcome requires a comprehensive assessment not only of economic and environmental risks, costs and benefits, but also of the social dimension of the issue. A consideration of health impacts for individuals and communities living near contaminated sites is particularly relevant, as international research suggests that these are significant and complex and extend beyond the risk of immediate physical harm to impact on the psychological health of both individuals and communities (Edelstein, 2002; Fleming, et al., 1991; J. S. Kroll-Smith & Couch, 1991; Mohai & Saha, 2007). Exploring the ways in which people – as individuals and as members of the community – think and feel about land contamination and remediation is critically important in helping to understand these psychological health impacts. However, studies exploring community feelings, perceptions and attitudes to land contamination and its remediation within the Australian context are extremely limited.

This paper reports on research that addresses this gap. It responds to the need expressed by regulators, site managers and other practitioners in the contaminated lands industry, for a better understanding of how Australian communities experience and perceive contaminated land and its remediation. This Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE)-funded research commenced in 2008 and is being undertaken by the Institute for Sustainable Futures, at the University of Technology, Sydney. This paper presents the findings of one component – a resident survey – of this mixed method social research project. The residential survey involved a random telephone survey conducted in early 2009 with 400 residents living in proximity to the Botany Industrial Park and Southlands contaminated sites in the southern suburbs of Sydney.

The paper begins by outlining the significance of community involvement in the management and remediation of land contaminated by industry, and the emergence of an international body of research exploring residential communities and their experiences of, and attitudes and feelings towards, these processes. Drawing on this international literature, we identify two themes that were used to structure the survey, namely the impact of the contamination on the lifescape of residents living near the site, and the sense of stigma associated with contamination and whether this might be transformed by the remediation process. The paper then provides an outline of the survey methodology before presenting the research findings and analysing them according to these two themes.

The intent of the study is to better understand community experiences and responses in order to provide insights that will be valuable in informing the management and remediation of contaminated lands. We also hope that improvements in these processes can contribute to the improved wellbeing and alleviation of health impacts for individuals and communities living near contaminated sites, which international research suggests are significant and complex and extend beyond the risk of immediate physical harm to impact on the

psychological health of both individuals and communities (Edelstein, 2002; Fleming, et al., 1991; J. S. Kroll-Smith & Couch, 1991; Mohai & Saha, 2007).

Community participation in the management of contamination at BIP and Southlands

The site that is the subject of this paper is known as Botany Industrial Park (BIP), or Southlands, a long-time industrial site located in southeast Sydney. There are many different types of contamination over a range of parcels of land at this site; indeed one senior government official has called the contamination at BIP and Southlands 'the most serious ground contamination issue in Australia' (Huxley, 2005).

Contamination at this site includes a large groundwater plume contaminated with chemicals such as 1,2 dichloroethane (first identified in the 1970s and early 1980s), Australia's only significant stockpile of HCB waste (over 10,000 tonnes stored in barrels) and various areas of soil contaminated with numerous compounds. The diverse array of contaminants found at Botany Bay is the result of the area's long industrial history – from 19th century tanneries through to chemical manufacturing plants owned by the company ICI, which started operations in the area in 1944. Responsibility for remediation of these various contaminants has, to date, been attributed to Orica (ICI until 1998). Various remediation technologies over the past two decades have been used and continue to be used in an attempt to remove, separate, destroy or contain the various forms of contamination at BIP and Southlands (CRC CARE, 2008).

Within the international, national and NSW State level legislative, regulatory, planning and decision-making framework associated with the management and remediation of contaminated lands, the participation of affected communities is being increasingly recognized as vital (United Nations Department of Economic and Social Affairs, Division for Sustainable Development, 2005, see s.20.21 (b); Intergovernmental Forum on Chemical Safety, 2000; National Environmental Protection Council, 1999b; Greenberg & Williams, 1999; New South Wales Department of Urban Affairs and Planning & Environmental Protection Authority, 1998; Santos, Covello, & McCallum, 1994; Walker, Simmons, Irwin, & Wynne, 1999; Phil Brown, 1992).

When discussing community, these diverse legislative and planning instruments focus on the 'community of risk' (Brown, 1987) associated with management of contamination and remediation, and the communication that takes place within this community. The community of risk is that which forms out of the interconnection of previously separate individuals and communities that come together as a result of risk(s) associated with the contaminated land. As the Australian National Environmental Measure for contaminated land notes, "the community includes regulators, site assessors, environmental auditors, land owners, developers and industry" (National Environmental Protection Council, 1999a, p.4). In the case of the contamination at BIP and Southlands, the community of risk includes the residents who live in physical proximity to the contaminated land who are immediately affected by the risk. Within the community there are also various community structures, local action groups responding to the risk, interest groups and NGOs with a broader base, and official bodies with some regulatory responsibility for aspects of the situation, amongst others (Brown, 1987).

Over the past decade community involvement and information sharing associated with the management and remediation processes surrounding the various forms of contamination at BIP and Southlands have been facilitated through a range of engagement techniques. These include community liaison committees (e.g. Community Liaison Committee (CLC) for ground water pluming established in 1993, and HCB Communication Participation and Review Committee (CPRC) established in 1997) and a range of other consultative mechanisms such as community newsletters and meetings. In recent years elements of these public participatory processes, in particular the CPRC have been the subject of extensive ongoing research (Benn, Brown, & North-Samardzic, 2009; Benn, Dunphy, & Martin, 2009; Benn & Jones, 2009; Brown, 2009; Brown & Benn, 2009; Carson, 2009; Daniels, 2009; Grace, 2009; Healy, 2009; Hillier, Gennissen, Pickering, Smolenski, & with an introduction by Paul, 2009; James, 2009; Jensen-Lee, 2009; Lloyd-Smith, 2009; Rae & Brown, 2009).

International research into residential communities and their attitudes, feelings and experiences of contaminated land

The increasing focus on the involvement of affected residential communities in land management and remediation processes, is driven by recognition that such inclusive processes can deliver a range of benefits to these communities, including health benefits (New South Wales Government & New South Wales Department of Environment and Climate Change, 2008, p.3). Throughout the past few decades this body of research from within such fields as environmental health, sociology, environmental psychology, and environmental justice, has offered insight and understanding of the ways in which people – as individuals and as members of the community – think and feel about land contamination and remediation (see for example Greenberg & Schneider, 1996; Becker, 1997; Lester & Temple, 2006; Slovic, 1990; Edelstein, 2002; Mohai & Saha, 2007; Phil Brown, 1992; Stoffle, Traugott, Stone, McIntyre, & Jensen, 1991; Freudenburg & Pastor, 1992). This international research suggests that the health challenges facing individuals and communities living near contaminated sites are significant, complex and extend beyond the risk of immediate physical harm to impact on individuals' psychological health (Edelstein, 2002; Fleming, et al., 1991; J. S. Kroll-Smith & Couch, 1991), and the 'health' of communities (Edelstein, 2002; Mohai & Saha, 2007). Given the brevity of this paper and for the purpose of the study it presents, we will restrict our brief discussion to two themes that emerge from the international research.

Firstly, the international literature explores how contaminated sites and remediation impact on the lifescape of those who live near the site, that is, inverts or disrupts people's normal assumptions about life. Edelstein (2002) summarises the five key dimensions of lifescape and how they are disrupted by the experience of contamination. Normal optimistic assumptions about health are replaced by a focus on risk and uncertainty. Positive feelings of personal control are replaced with a sense of threat, insecurity and doubt and people's sense of fairness and justice may be violated. Where once 'home' was associated with privacy, or protection, and provided a sense of security, status, self identity and attachment to place, the knowledge of contamination can replace these positive associations with negative associations, as 'home' becomes stigmatised. The local environment becomes a site

that harbours danger, and people's trust in social and institutional support systems can break down (Edelstein, 2002). These significant lifestyle impacts are one explanation for the stress that is commonly identified as an effect of exposure to the health and safety risks associated with contamination (Edelstein, 2002; Kroll-Smith, Couch, & Marshall, 1997).

Secondly, the international literature explores the stigma – the social and economic devaluing of a community – associated with contamination and how this might be transformed as a result of remediation. The research identifies that there is commonly a sense of stigma associated with contaminated sites and, by extension, a social stigmatisation of the communities that surround them (Becker, 1997; Edelstein, 1988; Edelstein, 2002). The establishment of pollution or contamination boundaries can isolate and stigmatise the community within (Edelstein, 1988) and can create 'a new shared identity ... for those living within designated boundaries of contamination' (Edelstein, 2002). Stigma associated with contaminated land may also extend not only to the people but things and places in the surrounding area that get affiliated with the contamination. A number of researchers acknowledge the existence of 'stigma' in respect of real property - property rights relating to land, (Patchin, 1988; Patchin, 1991; Patchin, 1994; Rinaldi, 1991; Mundy, 1992; Howland, 2000; Weber, 1997; Syms, 1997) that is driven as much by clearly articulated real risks as it is by intangible perceptions based on fear.

Whilst the growing body of international research on communities and individuals described above is important, the research is focused on Europe and North America and there is only a nascent body of literature exploring the relationship between communities and contaminated land governance and management (see for example Bubna-Litic & Lloyd-Smith, 2004; Lloyd-Smith, 2003; Morrison, 2003; Willmore, Sladden, Bates, & Dalton, 2006) and an extremely limited research exploring feelings, perceptions, attitudes and experiences to land contamination and its remediation within the Australian context (see for example McGee, 1998). This paper reports on research that seeks to contribute to this limited although growing body of Australian Research, to the need – expressed by regulators, site managers and other practitioners in the contaminated lands industry – for a better understanding of how Australian communities experience and perceive contaminated land and its remediation.

An investigation of community experience, feelings and attitudes to contaminated lands and their remediation within the Australian urban context

In an attempt to contribute to the observed research gap in the existing Australian research, a mixed method research (Greene, Caracelli, & Graham, 1989; Tress, Tress, & Fry, 2005) project was conducted in 2008-2009, investigating community attitudes and experiences to contamination and remediation within the Australian context. The mixed method approach was aimed at generating original primary empirical research on community perceptions of contaminated lands, using a variety of data gathering and analysis methods including media analysis, content analysis, stakeholder analysis, in-depth interviews, community survey and focus groups. This paper reports on the findings from one component – a resident telephone survey – of this mixed method social research project that aims to provide insight into experiences, feelings, perceptions and attitudes of residents living in the vicinity of

BIP and Southlands to the management and remediation of the contamination at these sites. Given the brevity of this paper and the fact that several parts of the more detailed qualitative research that will be used to provide further insight into the survey findings were not completed at the time that this paper was written, the presentation of the survey findings within the later part of this paper are only partial and our ability to provide qualitative insight into the largely quantitative survey has been limited.

The residential telephone survey was selected because it provided the opportunity to obtain a random stratified sample of the residential population living in the vicinity of BIP and Southlands. Survey questions were designed to explore the two themes from the international literature discussed in the previous section, namely impacts on lifescape, and experiences of stigma.

The survey population was drawn from adults (>18 years) living within a 5km radius of BIP and Southlands. Respondents were selected at random from a commercially supplied database of approximately 6,230 residential telephone numbers in Botany Bay and the surrounding suburbs of Port Botany, Banksmeadow, Hillsdale, Matraville (residences west of Bunnerong Road only), Eastgardens and Pagewood. Surveying was conducted between 9th February and 4th March, 2009, with initial quotas for age and gender¹. Potential respondents were screened to ensure they were aged 18 year or over, lived within one of the selected suburbs and were aware of the Botany Bay Orica contaminated site. Response rate² to the survey was approximately 25 per cent. Ninety potential respondents, mostly those in the 18-29 age group, were deemed ineligible to participate due to having no knowledge of contamination at the Botany Industrial Park or Southlands. While the gender quota was met³, the age quota was discontinued. This was because the higher-than-expected proportion of younger residents unaware of the contaminated site made it impractical to calculate the population of adult residents within selected suburbs who had heard of the BIP and Southlands. Results from the survey were analysed using SPSS. Statistically significant differences were calculated using the appropriate one-way ANOVA test. A survey of 400 residents within a random sample of 13,147 provides a sampling error of 4.9 per cent at the 95 per cent confidence level. In effect, this means that if a similar survey were conducted 20 times, results should be representative of all those in the survey population to within +/- 4.9 per cent in 19 to 20 of those surveys.

The findings from the survey are presented in four parts. The first two parts provide a 'demographic profile' of the survey cohort and information on the level of 'concern' and 'interest' that the cohort had in the contamination and its remediation. The remaining two parts present the findings in relation to two of the themes that the survey set out to investigate, namely the impact on the lifescape of those who live near the contaminated lands, and the sense of stigma associated with contamination and whether this might be transformed as a result of the remediation process.

Demographic profile

In this partial quota sample slightly more than two in five respondents (41 per cent) were aged 35-54, while 31 per cent were 55-74 and 11 per cent were above 75 years of age. However, with only 17 per cent of participants aged 18-34 (against 31

per cent of the Botany adult population (Australian Bureau of Statistics, 2006), this means the survey results are skewed slightly towards older residents. This skew was partially a result of those aged 18-34 not qualifying for the survey, as they did not know about the Orica/ICI contamination site. Of the 400 respondents, the gender split was 55 per cent female, and 45 per cent male. This compares to a gender split for the Botany Bay area of 51 percent females and 49 per cent males (Australian Bureau of Statistics, 2006). Although the sample is skewed slightly towards females and older residents, results have not been weighted to reflect specific age and gender breakdown. This is because (a) the gender profile is within 5 per cent of ABS data; and (b) the age profile was skewed by the lack of knowledge of Orica/Botany Industrial Park by many younger residents, hence affecting the target population size.

Within the survey there is a good mix of residents from the suburbs surrounding the contaminated lands at BIP and Southlands: two in five respondents (39 per cent) lived in Botany, 23 per cent in Pagewood and 18 per cent in Hillsdale. The remainder lived in Matraville (11 per cent), Eastgardens (6 per cent) and Banksmeadow (3 per cent). The majority of respondents (89 per cent) had lived in the local area for more than five years, with 68 per cent having lived in the area for more than 10 years. One in ten had lived in their current residence for one to five years, while only 1 per cent of respondents had lived there for less than a year. More than 80 per cent of respondents owned their residence and 48 per cent had children living in the household. Forty six per cent of respondents reported a household income (excluding government benefits) of \$50,000 or more, while only 14 per cent said their household income was \$10,000 or less. Around one in five respondents (22 per cent) declined to answer this question. In terms of education, almost three in five of respondents (59 per cent) had taken part in some post-secondary education. A further 12 per cent had completed year 12 or equivalent, while 21 per cent had completed year 10 or equivalent.

Concern and interest

Concern about the contamination was high among many of the 400 respondents, with an overall mean of 3.96 (based on a scale of 1 to 5, with 1 being not at all concerned and 5 being extremely concerned). In fact, only 11 per cent of the respondents reported not being at all concerned about the contamination at BIP and Southlands. This generally high level of concern perhaps explains the high level of interest in receiving information about the site – more than half the respondents reported a moderate to high interest in keeping up to date with the contamination and remediation, with the overall mean being 3.80 (based on a scale of 1 to 5, 1 being not at all interested and 5 being very interested). As one of the survey respondents noted:

With the underground water contamination and the possibility of cancer causing contaminants, I think a lot of the residents were concerned which has led to community uproar.

Those respondents with children living in their household reported a significantly higher concern for, and interest in, keeping up to date about the contamination and remediation process. In fact, a significant difference was found by using an

independent t-test between respondents who did (3.95) or did not (3.67) have children living in the home. Similarly there was a significant statistical difference amongst respondents who had children living in their home (35 per cent, 141 out of 400) (4.12) and those who didn't (3.82) (65 per cent, 259). The higher levels of concern associated with households with children is not uncommon when parents and other child minders are faced with the presence of environmental toxins (Lanphear, Vorhees, & Bellinger, 2005; Rice & Barone, 2000; Mullins, et al., 2007; Horwitz, Leaf, & Leventhal, 1998).

The youngest survey cohort (18-35 years) was less concerned about the contamination (3.76) and less interested in being informed about the issue (3.48) than those in the older age cohorts. Those in the 35-54 age group reported the highest concern (4.11) and interest (3.98) of all age cohorts. Level of education appeared to affect people's interest in keeping up to date with the issue, but not their level of concern. Interest in keeping up to date with the contamination was lowest for the year 12 educated respondents (3.45) and highest for those who had completed post-secondary education (3.94), and this was a significant difference. There are no significant differences in the level of concern or interest based on income or gender, indeed male and female respondents recorded the same mean scores (3.96) for level of concern.

Impacts on lifescape

By focusing on the capacity of environmental contamination to disrupt the lifescape, the survey sought insight into the way in which contamination impacts on people's 'normal' assumptions about life – particularly as they relate to health, personal control, home, environment and trust. Edelstein (2002) has described the impacts of contamination on these assumptions as creating 'turbulence' in the lives of individuals and our analysis provides examples of how this kind of disruption and turbulence was experienced by the local communities living near BIP and Southlands. Trust was considered in the previous section and feelings of control will be touched on in following sections of this paper; this section reports on how the 400 respondents experienced contamination as creating significant health and safety fears and disruptions to their normal assumptions about both 'home' and the wider local environment.

As Edelstein (2002) has noted, the decaying sense of safety within and around the home that results from toxic contamination is confirmed, equally, by parallel efforts by residents to avoid activities that normally comprise the acts of everyday life. Whilst the majority of our survey respondents (76 per cent, 312) claimed that awareness and knowledge of the contaminated lands had *not* changed the daily habits of their household, just over one in five (22 per cent, 88) indicated that it had caused them to change their habits. The majority of these reported disruptions were linked to health and safety concerns associated with chemical contamination of the groundwater. The concern for groundwater contamination was particularly acute because residents had been using bore water on their gardens (including vegetable gardens), to fill their swimming pools and spas, and as drinking water for their pets. Disruptions to household life directly resulting from the groundwater contamination were reported to include not being able to use bore water (18 per cent, 73), no

longer growing vegetables in the garden (9 per cent, 35) and the water tank provided by Orica taking up yard space (2 per cent, 9).

Other lifescape distributions identified by the respondents also extended to the safety and freedom of children, with almost one fifth of the respondents who lived in households with children (19 per cent, 36) reporting that they would no longer let their children play unsupervised outside due to the belief that their children's health may be adversely affected by exposure to toxic contaminants in the groundwater and soil that have resulted from the industrial history at BIP and Southlands. While such restrictions are grounded in the knowledge that children generally have a higher susceptibility to environmental toxins (Lanphear, et al., 2005; Rice & Barone, 2000), the degree to which children's play freedom is curtailed is also determined by carer's level of stress, fear, dread, uncertainty and anxiety about possible impacts of environmental toxins (Lanphear, et al., 2005). The respondents indicated that disruptions caused by the contamination also extended beyond the confines of the home into the surrounding suburban and natural environment. Survey respondents (4.5 per cent, 18) indicated that since being aware of the contamination they no longer went boating in or used estuaries in the vicinity of BIP and Southlands.

Stigma

Stigma is a discrediting judgement that in turn evokes a response from those stigmatised (Goffman, 1968; Gregory & Mendelsohn, 1995). Stigma occurs when certain products, places, peoples or technologies are identified as dangerous and subject to avoidance given their affiliation with different forms of risks (e.g. health) (Gregory & Mendelsohn, 1995). Questions within the survey were designed to explore the feeling of stigma experienced by the residential community in the vicinity of BIP. To do this we asked the 400 respondents how they felt perceptions of their local area had been affected as a result of the contamination and whether the remediation process had altered these perceptions.

To explore the issue of stigma, we first asked the 400 respondents if they believed the contamination had affected other people's perceptions of their area. Nearly half (49 per cent, 192) reported no affect (or were neutral). A slightly smaller proportion (43 per cent, 172) believed it had adversely affected other people's perceptions. A larger proportion of residents in the suburbs of Pagewood (160) and Botany (90) than in other suburbs felt that the contamination had not affected how others perceived their area, whilst residents in the other suburbs of Banksmeadow (12), Hillsdale (71), Eastgardens (22) and Matraville (45) were more likely to feel that other people's perception of their suburbs had been adversely affected by the contamination. To further explore the feeling of stigma experienced by the residential community, we asked the 82 per cent (330) of the survey respondents who owned their current residence if they felt their property value had been adversely impacted by the contamination. Over a half of the owners (58 per cent, 192) believed the contamination had no adverse affect on their property values, and over one third of the owners believed that the contamination had adversely affected their property value a little (22 per cent, 72) or a lot (12 per cent, 33). Only a small percentage thought that the contamination had improved other people's perception of their area (8 per cent, 32 out of 400).

When the 400 respondents were then asked about the effect of the subsequent remediation on other people's perceptions of their area, a majority thought that it had no effect (59 per cent, 256). However one-fifth (21 per cent, 84) believed that it had improved other people's perceptions of their area, suggesting that the stigma of contamination is seen to be reduced by remediation – if only by a minority of residents.

Concluding remarks

The paper has presented original empirical findings on the way in which residents living in the vicinity of contaminated lands experienced the management and remediation of that contamination. Apart from the fact that it provides much-needed Australian data on this issue, the study is significant in that it uses a random stratified survey of local residents. In doing so it moves beyond a focus on those members of the community who are more active participants in management and remediation processes, to consider the experiences of the community as a whole. In addition, the sample size of 400 allows us to make significant comments on whether experiences and perceptions are influenced by variables such as age, gender, income or education.

The paper has presented the findings from two of the themes that the survey set out to investigate, namely the impact of the contamination on the lifescape of residents living near the site, and the sense of stigma associated with contamination and whether this was transformed by the remediation process. Survey results confirmed theories from the relevant literature, in particular Edelstein's claim that the experience of contamination disrupts lifescape and claims by Becker (1997) and Edelstein (1988; 2002) that social stigmatisation can exacerbate negative impacts on a community's sense of wellbeing. Results also suggested that age may be a factor in the extent of concern, though theories as to why this might be the case remain unexplored at this stage.

We suggest that using the themes of impacted lifescape and social stigmatisation resulting from contamination can help to provide a better understanding of community experiences of, and responses to contamination. We hope that this approach can provide important insights that will be valuable in informing the management of contaminated lands and their remediation and that improvements in these processes can contribute to the alleviation of potentially negative impacts on people's health and wellbeing.

Finally, it should be noted that the survey findings presented in this paper are part of a larger research project, and the specific themes explored here are only two of a larger number of themes being investigated by the larger project. Obviously it would not be appropriate to rely on a singular source such as this survey as a means of understanding complex experiences, perceptions, attitudes and feelings. Therefore this paper should be viewed as presenting preliminary findings only, and the reader is encouraged to review future reports on further phases of this mixed methods research for a fuller discussion of findings.

Endnotes

1. As per ABS Census data 2006, Usual Residents profile, for the sum of the six suburbs surveyed.
2. Defined as the percentage of potentially eligible respondents who chose to participate in the survey.
3. To within a pre-agreed 5 per cent tolerance level.

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