Community engagement on biosolids reuse options in Kaikōura: an insight into community views on contaminants

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ABSTRACT

Community engagement is a vital component in determining acceptable and sustainable reuse solutions for the management of biowastes in New Zealand.

This paper focuses on a case study of the small South Island community of Kaikōura and documents key stakeholder views on contaminants derived from an engagement process with the community to determine their preferred sustainable reuse solution(s) for stockpiled biosolids. The research is a component of the multi-disciplinary Biowastes programme which has been developed to better understand the environmental risks and benefits that can arise from applying biowastes (particularly biosolids) to land. The fundamental core to this research is the involvement of communities to explore important social, cultural and economic considerations integrated with emerging scientific environmental knowledge. In recognising that neglecting social and cultural considerations can lead to substantial roadblocks to land application of biosolids, community engagement is vital to gain a necessary understanding of community views. Opinions on contaminants primarily derived from a series of face-to-face interviews and hui with key Kaikōura stakeholders provide an insight into community views on contaminants, and highlights that they could be a significant road block to acceptance of land application of wastes.

Kaikōura is the only EarthCheck (formerly Green Globe) certified community in the world. This provides an excellent platform to develop community engagement methods in a community with a strong Māori focus in tandem with environmental research. Prefacing this research is a stockpile of sewage sludge that has been dredged from the Kaikōura oxidation pond – accumulated for the past 25 years from a permanent population of about 3500 and an annual tourist population of up to one million visitors. The current storage is controlled by a resource consent and is time sensitive therefore Kaikōura District Council and the community are eager to explore both economic and environmentally sound reuse options.

In 2010 key stakeholders were interviewed to explore what they value about their environment, what they thought should be done with existing biosolids, and what concerns they had about the possible impact of biosolids reuse. Few of the stakeholders interviewed had an extensive knowledge of biosolids and best management practice. However, they considered that knowledge of its composition would be a key determinant in their selection and support of preferred reuse options. They provided insight to views on land application of the biosolids, concerns of the cost of solutions and owning the issue (not wanting to transport

the problem elsewhere). Views were expressed on the contaminants with issues concerning microbes, metals, chemicals and pharmaceutical and body care products. Similar views were expressed at stakeholder hui and concerns were raised around compromising future land use and "risk for us, our children, our children's children" from emerging or currently unknown contaminants.

KEYWORDS biosolids reuse; case study; key stakeholders; community; contaminants

INTRODUCTION

In New Zealand about 3.2 million tonnes of waste are sent to landfills each year. A large proportion of this is organic biowastes (food, garden and household wastes). Biosolids (treated or stabilised sewage sludge) are one form of organic waste which are carbon-rich and contain valuable nutrients. However, biosolids can contain a range of micro-contaminants such as heavy metals, pathogens and pharmaceuticals and personal care products (PPCPs).

A publicly funded research programme entitled the 'Biowastes programme' (FRST C03X0902) has been developed to better understand the environmental risks and benefits that can arise from applying biowastes (particularly biosolids) to land (Horswell et al. 2011). A multi-disciplinary team of scientists from ESR, Scion, Landcare Research, Cawthron Institute, Plant and Food Research, Lincoln University and an independent research organisation have partnered with Te Rūnanga o Kaikōura and Whenua.biz to undertake the research. The Biowastes programme is focused on the application of biosolids to land as a sustainable option for New Zealand, providing the risks are well managed and understood. However, the option of land application may, or may not be accepted by New Zealand communities. Ongoing uncertainties around social and cultural acceptability, possible emergent risks, and the challenges in determining costs for alternative reuse or disposal methods mean that local authorities continue to landfill biosolids/biowastes, rather than explore or promote more sustainable options.

The fundamental core to this research is the involvement of communities to explore these important social, cultural and economic considerations in tandem with the emerging scientific environmental knowledge. Further, the research programme is actively integrating biophysical and social science and encourages a shared-learning process for end-users, Māori, and other stakeholders to develop viable strategies for biosolids reuse. The Biowastes team endeavours to better understand how a reuse decision is considered and debated by tangata whenua, Māori waste managers and other business operators, local government and the wider community.

Biowastes programme research is based on two case studies, one in Kaikōura and one in Mokai, near Taupō. This paper focuses on the first of these case studies and highlights community views on contaminants within the research, principally from face-to-face interviews which were conducted with key Kaikōura stakeholders.

METHODS

Kaikōura case study

Kaikōura, a South Island coastal town, is the only EarthCheck (formerly Green Globe) certified community in the world in recognition of its commitment to protecting the environment and working towards sustainability for their community, visitors and future generations. In addition, the Kaikōura District Council was one of the first councils in New Zealand to adopt a 'zero waste' policy. The environment and clean green image underpin the success of the town's thriving Māori owned and operated tourism industry. Sewage sludge was dredged from the town's sewage settling ponds in 2006, following approximately 25 years of use from a permanent population of about 3500 and an annual tourist population of up to one million visitors. Approximately 1500 tonnes of sewage sludge/biosolids has been left to weather in a decommissioned filtration pond at the Kaikōura District Council waste treatment plant under a resource consent granted for 10 years. However, with less than half of the time remaining on this consented biosolids storage the council is keen to engage with the community to explore beneficial reuse options.

In October 2009, the first Biowastes programme hui was held in Kaikōura to begin engagement with key stakeholders who have a direct interest in, or were likely to be affected by, the management of Kaikōura biosolids. This included representatives of tangata whenua, Te Korowai o Marokura (a community environmental action group), business operators, local government, commercial and recreational fishing and other environmental groups. This hui led to the selection of key stakeholders and subsequent face-to-face interviews with them. Each interview explored what they value about their environment, what they thought should be done with existing biosolids, and what concerns they had about the possible impact of biosolids reuse. Key stakeholder interviews and a second hui which was held with key stakeholders to select reuse options for the stockpiled biosolids provide insights into community views on contaminants.

Aim of key stakeholder interviews

The aim of the Kaikōura case study interviews was to establish:

- What Kaikōura residents value about their environment (e.g. Green Globe certification, sustainability, etc.);
- What they think should be done about the biosolids (what is their existing knowledge base, what are their visions);
- What are their concerns about the possible impact of biosolids disposal; and
- What role they feel that the community should play in the decision-making process.

The development of the interview process entailed a range of activities from establishing who key stakeholders would be and securing their agreement to participate, to development of materials that could be used at the interviews such as the questions and associated support materials.

Establishing key stakeholders

Data originally collected at the October 2009 hui proved a rich resource to identify key stakeholders, with suggestions spanning representatives from Te Rūnanga o Kaikōura, local and regional councils, government agencies, local businesses and marine tourist ventures, and special interest and advocacy groups for environmental concerns.

Development of interview materials

The style of consultation and interview was canvassed from other recent, local and relevant projects, such as the Little River Waste to Resource Project (Yamabe et al. 2009), and the Porirua biosolids case study (Baker et al. 2009). These methods were developed into a semi-structured interview to meet the enquiry aims of the Kaikōura stakeholder interviews. Lists of biosolids treatment and reuse options were also developed, with assistance from biophysical scientists in the Biowastes programme, to inform or be available to interviewees during the interviews.

Data collection

The initial contacts were made by telephone and email or letter summarising the nature of the research, the aims of the interviews and practical details concerning appointment times and location. A project information sheet was also supplied.

Each interview commenced with a short description to ensure that the details of the research for Kaikōura stakeholder interviews had been understood. This was also an opportunity to ensure that the meaning of 'biosolids' was understood and to reaffirm that all information from interviewees would be collated anonymously. Confidentially was assured and with permission from the interviewees all data were collected using digital recorders and later transcribed.

Pilot study

A pilot study was undertaken in April 2010 with two community representatives. Both interviews were successful, but revealed the impact of different levels of underlying knowledge on being able to answer the questions posed. Accordingly, the questions were revised to allow either of two discussion streams for the interview – one for those with underlying knowledge or interest in biosolids treatment and reuse, and another for those without underlying knowledge or with no strong feelings. The changes were relatively minor although it did include a new question not posed to the pilot interviewees, and all data were included in subsequent analyses and reporting.

Scope

Given the open nature of the semi-structured interview the responses were entirely dependent on the consideration and account that the interviewees could give at the time. They may well have agreed with comments offered by other interviewees, but only those made spontaneously were recorded. As such the number of responses arising from the semi-structured interviews does not necessarily correlate with the total number of participants canvassed. Comments provided by interviewees have been reproduced as closely as possible to the original.

Resulting interviews and hui

Twenty-four key stakeholders were interviewed in 22 interviews (one interview comprised three people) in mid-2010. In February 2011, a second Kaikōura hui was held with key stakeholders to further develop and focus reuse options for the stockpiled biosolids. This provided further insights into community views on contaminants.

RESULTS AND DISCUSSION

All of the 24 interviewees (with the exception of one participant who lived elsewhere for 50% of their time) were permanent residents of Kaikōura. The range of years living in the town varied from 4-55 years (median 23 years). Interviewee age ranged from the 20-30 year to over 65 years age brackets with 17 respondents (about 70%) over 50 years of age.

Few of the stakeholders interviewed had an extensive knowledge of biosolids and best management practice. However, they considered that knowledge of its composition would heavily influence their decision on appropriate reuse option(s). They provided insight to views on land application of the biosolids, concerns of the cost of solutions and owning the issue (not wanting to transport the 'problem' elsewhere). Views were expressed on the contaminants with issues concerning microbes, metals, chemicals and pharmaceutical and body care products.

Four themes were explored during the interviews and generated the following responses:

What do Kaikōura residents value about their environment?

- Interviewees gave a very clear picture of aspects about the town that were important to them, with special emphasis on the quality of the environment and an important sense of being part of the community.

What do they think should be done about the biosolids?

- There was strong enthusiasm for managing biosolids reuse in the town, according to the recycling principles that prevail;
- For many the biosolids were not perceived as 'treated' and there were many concerns about the composition of the biosolids and the presence of residual contaminants that might be harmful to both the environment and health;
- Information from scientific analysis was seen as an essential requirement to direct the eventual selection of biosolids reuse option(s);
- There was some interest in use of the biosolids for fuel, power or to treat damaged land, but this also raised questions about inherent cost and volume requirements and possible air pollution and;
- There was unanimous interest in the possibility of land application, but with mixed views on whether or not biosolids should be used on productive or non-productive land. More particularly there was interest in whether it should or should not be used on farm land within the food chain.

What are their concerns about the possible impact of biosolids disposal?

- Many were concerned about leachate from or through the biosolids affecting underlying soils, aquifers and waterways;
- There was concern about readiness of the wider community to accept land application; and
- There was concern about adverse long-term implications of any initiatives – aspects that might not be foreseeable now.

Measures such as learning from overseas initiatives, gaining financial support, managing the location points of dispersal, education and communication, and conducting a pilot within the town were offered as possible solutions to these concerns.

What role do they feel that the community should play in the decision-making process?

- Further stakeholder groups were suggested, including those representing medical professionals, farmers, tourist accommodation, business organisations, Kaikōura dairy factory, and schools or students;
- There were mixed views on how the public should be consulted. These ranged from an open forum for the community as a whole, to a smaller working group comprising stakeholder representatives;
- Two tiers of information needs were identified, ranging from 'short and simple' to 'detailed and comprehensive'; and
- Many felt that the decision making was, ultimately, the responsibility of the council.

An insight into community views on contaminants

Although the questions were not focussed specifically on their views on contaminants, through the course of the interviews this issue was frequently raised by interviewees thus allowing an insight to be obtained on the Kaikōura community's views on contaminants.

Many interviewees considered that the biosolids are currently a product with the potential to contaminate.

> *"The stuff they've got piled up there now - how bad is it? I would imagine it's not great stuff by a long stretch - what would you need to do to bring it back?"*

> *"I'm quite open to recycling and using it as no waste is bad waste. If we could get out the bad stuff that would be good but then I suppose it's got to go somewhere then doesn't it?"*

Typically the types of issues mentioned were unknown concentrations of heavy metals, chemicals, toxic products, acids, pharmaceuticals, nitrates, hormones, or elements that are hazardous to the environment or humans. There was also concern about by-products from humans that might cause disease, such as viral matter or "bad" bacteria. The high through rate of tourists potentially carrying contaminants was noted, as was the longevity of any undesirable microbial or viral DNA which has the capacity to resist treatment and lie dormant for many years.

> *"A concern is around biological problems and the longevity of viral matter because we have so many tourists through here - it is quite possible that they are carrying something and are unaware of it."*

Concern was also raised about the nature of growth from plants or grass grown with biosolids and whether or not contaminants follow through to the plant or grazing into the food chain.

When discussing land application options about half the interviewees voiced concern was about the contamination of underlying soils, waterways and, eventually, the sea from contaminated water leaching out of the biosolids, or from rain water washing through it.

> *"You wouldn't want to get it flowing into streams if it has the same impact as say the excrement from dairy."*

The shallowness of the town aquifers and hence greater potential for contamination was also noted.

The potential negative impacts of initiatives

About a third of the interviewees were concerned that, whatever initiative was selected for biosolids reuse, it should not have adverse consequences either 'further down the line', or at a later date. Examples where similar initiatives had had unexpected adverse consequences were given, such as: contamination and lengthy deterioration times of products once advocated for disposal at landfills; contamination of waterways from farm effluent; making the product too costly to appeal to the target market; costly waste collection facilities encouraging illegal dumping; and facilitating undesirable practices (such as mining) by offering a final appealing solution.

> *"We should become more innovative in the way that we do things so we don't have to come up with solutions to clean up a bit of land because we have done so and so to it - we should be trying not to ever damage in the first place."*

> *"In today's world we see things that have been put on the ground 10 or 20 years ago and now they're suffering from diseases they've got from it."*

> *"Let's learn from those lessons. Don't just look at the short-term fixes. Let's see if all this study and research can say we can now come up with a process for this solid that's going to sustain us forever."*

There was also a cautious note about tracing back a serious disease (i.e. Bovine Spongiform Encephalopathy - BSE) to a practice once considered acceptable and safe.

At the second Kaikōura hui held with key stakeholders to further develop and focus reuse options for the stockpiled biosolids in February 2011 further insights into views on contaminants were obtained. The stakeholders agreed that as several of the heavy metals (cadmium, zinc, copper and mercury) were elevated (although not a concern to human health), any application to land needs to be managed to ensure there are no adverse environmental effects, like ensuring biosolids do not enter rivers and waterways. Similarly, caution was expressed to ensure that biosolids are not used for amending soils for food production as some microbial contaminants were present at low concentrations. In addition,

participants raised concerns around compromising future land use and "risk for us, our children, our children's children" from emerging or currently unknown contaminants. Following a vote on preference for reuse options for Kaikōura, biosolids application to farmland was revealed as one of the top five options by participating stakeholders on the condition that the farming practices were outside the food chain.

CONCLUSIONS

Key stakeholder views from face-to-face interviews and hui in Kaikōura revealed a range of perspectives, showing both commonality in opinion and breadth of ideas or concerns. Together they provided insights on community views on contaminants.

The level of expertise and knowledge amongst key stakeholders in the Kaikōura community on both biosolids and their management, although low, did not preclude them from providing views on sustainable reuse options. Views expressed ranged from: direct land application, the economics of the costs, and the desire to own the issue and therefore reuse the biosolids in their district. Community concerns around the unknown effects of contaminant metals, pathogens, chemicals and pharmaceuticals and body care products in the waste stream, when applied to land, were seen as a potential risk for not only the current community, but also for all future generations. This unknown legacy of emerging or currently unknown contaminants was critical for the key stakeholders of the community.

This framework based on face-to-face interviews and hui provided a method of identifying community opinions, concerns and precautions when dealing with the unknown potential of contaminants and may be a useful model for community engagement. This social research will link with environmental and economic research and results on options will be presented at a third hui to be held in March 2012 with the wider community to formulate community recommendations to present to the Kaikōura District Council. This will provide further opportunity to explore the community's views on contaminants as a biosolids reuse issue.

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