From the Farm to the City

From City to Soil

Organics - the recycling key

It has long been argued in the recycling industry that the principal driver, which must be secured before a material is collected and processed, is a viable long-term market.

The reuse industry has invested many thousands of hours and millions of dollars developing markets, establishing reprocessors, reducing contamination and designing collection systems. In many instances recycling the collected material into a lower quality product.

As an industry we have been concentrating mainly on the packaging industry, threatening container deposit legislation, banning plastic bags, formulating extended producer responsibility, and writing and rewriting packaging agreements with industry, and recycling paper, glass and plastic, only to find in the end that despite an international willingness on the part of the public at 90% plus to recycle, our domestic recycling programs return a very low percentage of around 5 to 30%, depending on the country.

This implies that it is not the people who are the problem, but the system.

Industry is better or worse at recycling and reusing depending on the industry type and the financial incentives.

Many of the programs associated with recycling began as anti-litter campaigns. An example is the “Do The Right Thing” campaign in Australia, which between 1979 and 1989 is credited with reducing litter by 70%.

These programs were very effective and as they expanded into fully fledged, though under-resourced, recycling programs, they have created many thousands of jobs world wide and have directed many millions of tonnes of resources away from landfill and back to productive use.

If you look, however, at the constitution of the range of materials we collect in waste and recycling systems and fully evaluate their long-term and short-term benefit and value to the broader community, it is perhaps true that we have been concentrating on the more difficult and less profitable material streams.

The recent drought combined with soil degradation in Australia has resulted in a heightened awareness of the need to maintain quality soil and the potential return of organic material to agriculture.

This in turn has developed a potential new focus for recycling for our industry.

Return on Investment

The cost to ratepayers of the "away" process, the investment in the removal of unwanted materials from their homes, will always provide a better social return in terms of community value, if focused on recycling rather than disposal to landfill.

If those spending public funds were able to consider 'value for money' rather than 'cost', then every aspect of the 'value chain' would be calculated into the broader community benefit of each of the options.

In fact if kerbside collection for disposal to landfill and kerbside collection for recycling are considered in 'value for money' terms, the overwhelming benefits of recycling soon become obvious.

A very good local example of this is the kerbside collection and recycling programs in Canberra, ACT.

When looking at the comparison in balance we should acknowledge that waste to landfill does give the community jobs - but only about a third of the jobs you get with recycling. In addition landfill gives you the long-term worry of a cesspit of mixed toxic wastes which will inevitably be a problem for your grandchildren's grandchildren and a tragic loss and liability to every generation in between.

In 1999 the ACT Government spent a total budget of around $15 million on waste management, around one third or $5 million was spent on recycling the remainder on waste collection and landfill management.

That is $5 million spent on recycling and $10 million on waste.

This $5 million recycling budget, that same year returned 250 jobs or around $10 million in wages – in addition it produced a trickle down effect of around three times that or about $30 million to the services industries, recycling also recovered around $20 million in reused resources and $10 million in air space. So you have a $60 million dollar return on a $5 million investment. An excellent return on investment.

This is the difference in value to the community of recycling versus landfill. The tragedy is that the economic minds which run Treasury would hate to lose the landfill site because it collects a small amount of money for disposal fees at the weighbridge, which it sees as income.

This is an example of the tilted playing field in which the recycling industries compete every day, where the competition, landfill, is subsidised 100% by rates and taxes.

This story is repeated all over the world in regard to recycling programs. The truth is – recycling works!

In the United States the total value of the waste and incineration industries per year is around $40 billion however the reuse and recycling industries total $236 billion – five times larger.

No matter where it occurs around the world the recovery of resources for reuse and recycling always has far more community and economic benefit that the destruction of resources through burning or burial. Recycling works!

Our human inability to change direction in this area is more related to our emotional attachment to stay with the process we know rather than changing to something we see as new and different.

Yet if we are unable to change our resource consumptive patterns in a world which is obviously resource limited, then surely we are forcing humanity to slowly but surely destroy its own economic and social future.

The most worrying and urgent example of this inability to change is our destruction of soils.

The true value of organic wastes

Civilisations which survive the ravages of time are those which have a reliable and consistent food supply. Those with a successfully structured agricultural base are those which nurture their soils. Caring not only for the plants but also for the biology of the soil which stimulates the release of nutrients and maintains soil structure, securing carbon and moisture and increasing land value.

Such civilizations have always been involved in the return organic waste to agriculture as a product which supports and stimulates the microbial activity of the soil. These processes were regarded as fundamental to successful agriculture until the rise and dominance of artificial chemical fertilizer.

Our attitude to organic wastes in today's modern society has moved us a long way from this model. We dispose of much of our organic waste to landfill.

It is a fact that the totality our industrial processes have brought us to a point where in excess of 90% of our production efforts return only waste. Of the goods manufactured and grown in this process, around 80% of it is buried in landfill within 6 months of production.

However, around 60% of all the materials we put into landfill is organic and a very large part of this has come from our own farming processes. It is this degradation of our farmland which is the single greatest threat to sustainability.

Farming is a mineral extractive industry, which progressively removes from the soil not only the organic fraction, but also minerals and trace elements. All of this material is

exported from the farm, carried into the cities or exported where it is processed through industry or people and after passing through a waste management system, ends up in either our landfill or our sewage treatment works.

Plants cannot make minerals and trace elements and these important structures in healthy plant growth are not put into our soils through the application of fertiliser.

The process of degradation of our soils costs us millions of dollars per year as a nation. At the same time one of the factors in this degradation, chemical fertiliser is constantly rising in cost, both to the farmer and to the broader community.

Australia's national fertiliser bill at the farm gate every year is in excess of $4 billion.

The protection of our national soil asset needs a national program involving all levels of government, industry and community. Our soils feed us all and create the nutritional and commercial activity for everything we are and everything we do. We cannot live without soils and we cannot export without soils. Given this we need to see ourselves as the creators of the solution for the protection of our most fundamental asset, the soil.

This soil protection program needs an ongoing source of income. A business, which can last forever.

That business is resource management. Or to be more precise, waste reduction. The focus of this new business would be the diversion of resources from landfill to farming. It will involve the engagement of the entire waste and fertiliser industries in the collection and processing of quality source-separated and composted products for distribution to agriculture.

The generation of waste and its disposal to landfill is one of the largest long-term problems facing society today. The process steals our space, devalues our property, threatens our waterways and contaminates the future. It is the graveyard of sustainability and it compromises the very survival of future generations.

At the same time, the other end of the process, farming, depletes our soil, pollutes our waterways, and increases our foreign debt.

Depletion of soil quality is a problem which is in the media around the world every day. A recent report in Britain stated that in excess of 30% of farm soils in the UK were deficient in organic material. Another from the World Wildlife Fund stated that three quarters of Southern European agricultural soils have 2% or less organic carbon.

Yet the greatest contaminant in landfill is organic material. It is the moisture from organic material, which leaches through the landfill to create further problems of contamination and pollution.

If this organic material was returned to the food chain through farmland application as a quality composted product, we would eliminate forever the problems of landfill, create local employment programs, go some way to relieving the destruction of our soils through the overuse of chemical fertiliser, grow higher quality produce and save money at the same time!

There is a constant cry from compost makers that there is no market for products. At the same time our soils cry out for the application of the organic materials, micronutrients and microbial activity, which is compacted into our landfills every day.

We need a national program which is focussed on the removal of organic materials from the waste stream and the processing of this material into a viable, safe, balanced organic product for use on farms. But it is financially viable? Can it be done?

City to Soil

It is clear that many successful societies throughout the world have programs which work within their culture to return organic material to the soil. We have a model for such a program in Australia that works within the existing cost structure for the management of wastes. It is called "City to Soil".

A synopsis of this project is at "Attachment A."

The project was conducted in Queanbeyan on the southern Tablelands of NSW.

Prior to the development of this project, Queanbeyan City Council had developed an in-house document, which indicated that the total net economic benefit of their existing composting process to the local community was $35 to$46 per tonne.
Our objective was to demonstrate that we could collect, process and deliver a quality product to farmers for less that it cost to dispose of material to landfill and to engage the community in the project by giving them real benefits for quality source separation.

The majority of projects associated with the management and recycling of wastes are focused on problem solving, diverting material from landfill and the costs associated with solving the problem.

This project is also focused on diverting material from landfill, but with the added incentive of providing increased benefits to agricultural use of the end product, providing additional wealth, which is then available to all participants in the system.

Research from around the world has demonstrated that quality organic product will improve soils and yields, one research document for Norway demonstrated that the farmer could make between $40 to $800 per tonne benefit.

The agricultural benefits of using quality organic material in agriculture are:

- Increased yield
- Improved crop quality

- Reduced water use
- Improved water efficiency
- Improved soil structure
- Increased microbial activity
- Reduced nutrient leakage
- Reduced fertilizer costs
- Reduced erosion
- Carbon sequestration
- Increased land value

Aim

This project sought to demonstrate that falling levels of organic materials in agricultural soils could be addressed in part by engaging the rural and urban communities together in a trial, which sought to increase soil health by returning quality composted product to agriculture.

Increased soil health brings benefits to the farmer by increasing yield and income and to the broader community by ensuring agricultural sustainability for future generations.

The project aimed to minimize alterations to existing systems in collection, processing and on-farm application. Using very simple bar-code technology and rear loading vehicles, a householder credit system was devised, which reduced contamination by 40%.

This in turn, lead to a cleaner, quality composted product with more direct application for the farmer, without the worry of contamination.

Cost/Benefit

The cost of landfill in the region where the trial was conducted, near Canberra, Australia's National capital, is now $77 per tonne. The cost of disposal of waste to landfill for Sydney varies from around $100 per tonne up to $150 per tonne.

Yet it is possible for a commercial processor to manufacture quality compost to Australian Standard AS4454 and carry the product at least 200 klms in any direction for a cost of $50 per tonne, including profit.

This means that the product can be delivered to the farm gate for far less cost to the community than disposal to landfill.

As this trial demonstrated however, when the farmer applied the product in his vineyard, his productivity in the trial area increased dramatically.

In the cool climate wine area where this compost was applied the sale value of the grapes on this vineyard was approximately $1300 per tonne. In the trial area the application of

compost at a rate of 10 centimeters depth gave an increase in yield of 230% - a value of more than $17,000 per hectare.

Given that these wine grapes were young, it is still expected that long term the grapes would still have produced an increased yield of at least 40% for 10 cm of compost.

This would mean that if the farmer paid a rate of $30 per tonne for the compost, the application cost would have been around $900 but it would have returned a profit of $3900 or a net profit of $3000 per hectare.

The second year of this on-farm trial has maintained the increase in yield at 82%.

The sale value of the compost can be returned to the community as community rewards and prizes to encourage clean, source separation of household product.

This project uses the same funds, which were previously used to landfill organic products to return them to useful function within agriculture. At the same time it generates profit and reward for all who participate.

This project is about the triple bottom line of social economy.

Replication Potential

Farming is a mineral extractive industry. It takes between 60 top 90 elements, minerals and nutrients to grow a plant. Yet where chemical farming is practiced many farmers now only return three chemical nutrients to the soil. All soils will inevitably suffer from this slow degeneration process.

The extraction process will also affect the organic levels of soils, reducing the materials on which soil biology lives, thus slowly killing the soil.

This project is not about putting companies out of business. It is about having people in the waste and fertilizer industries transport and sell a different range of products.

As a national community we must resolve to change to more sustainable methods of agriculture and as we do we must demonstrate that farming can be sustainable and that it can involve the entire community.

The “City to Soil” model will fit into any community. It will broaden the market to include not only the fertilizer and waste companies, but also the farmer and the general community, engaging them all in sustainable food production.

How then can we make this process work nationally?

Healthy Soils Australia

There is not a farmer in this world who wishes to leave their children acres of desolation and destruction. But the farmer is given no choice.

The farmer is the keeper of the nations soil. It is the farmer's activities, which will determine the long-term sustainability of our agricultural base, yet the farming family works in isolation from the city.

Who will provide the financial breathing space to allow for this urgently needed change? Who can provide the farmer with a viable, productive alternative to the constant use of chemical fertiliser responsible for the degradation of our soils and the reduction in food value of the crops produced on them?

How can we support the fertiliser companies in their distribution of this new range of products? How do we support the waste companies in their pursuit of this new business opportunity?

Protein levels are falling in the produce from many farming areas. Even the seemingly indestructible deep rich soils of the Queensland Darling Downs in Australia are producing crops with falling protein levels.

Everything we do, everything we export, relies on the quality of our soil and its ability to produce. In the state of New South Wales, 70% of the land is affected by at least one form of land degradation; almost 30% is severely to very severely affected.

In the massive watercourse that constitutes the Murray-Darling River basin we are losing up to $700 million worth of agricultural land every year to degradation in its various forms.

The juggernaut of global trade has forgotten that it cannot exist without the soil.

You cannot have a labourer in any country in this world make products for another country if that labourer cannot be fed, regardless of how cheap their labour may be.

It is the soils of other lands, which feed and clothe the workforce, which makes the goods for export. Indeed in many cases it is the soils themselves, which grow the goods for export.

The nation of Japan relies on 12 million hectares of land, outside its own landmass to maintain its inputs for production. Six million hectares of this land are in Australia, which, until some profound change takes place, will not be able to maintain is current level of exports in several generations.

The same is true for all nations. It is the soil, which fills the nations belly and enables it to work.

This is a national problem, not a farming problem, this is a people problem, not a political problem, it is a problem to be addressed by us all for the benefit of us all.

I would like to introduce you to a new group “Healthy Soils Australia”.

Healthy Soils Australia is a reflection of the need for us to gather together to address the problems of soil degradation and soil structure, not as a farming problem but as an issue of concern to the entire community.

It is a non-government organization focused on producing results by engaging all aspects of the broader community.

Healthy Soils Australia has been set up as an organization of farmers, scientists, businesses and community groups to develop partnerships with other land managers to improve soil quality.

Conclusion

The observations and examples I have presented here are simply that – the collected ideas and experience of one individual on the subject of soils and solutions.

What could we do, what could we generate if we did this together. If we used our collective power to assist each other with these problems.

This issues will not be addressed by regulation, they cannot be addressed by accusation, they are problems that will not be solved with blame and they cannot be resolved by government.

We must make change happen quickly if we are to provide a safe and sustainable future for our grandchildren.

The future of our trading partners, the future of agriculture and the future of your grandchildren are intrinsically linked.

The future of food is the future of soil – and soil is the mother of us all.

"Attachment A"

CITY TO SOIL

BACKGROUND

- Australia currently spends around $3 billion per year putting 26 million tonnes of waste into landfill. Approximately one third of this is in NSW. (Wright Consultants)

- Around 60% of the material put into landfill is organic. If correctly composted to AS 4454 this could be returned to agriculture. To achieve this we need to make a few simple changes to our waste collection systems. (DEC Sydney)

- The cost of disposal of a tonne of Sydney's waste to the new landfill site at Tarago in Southern NSW is $150 per tonne. (Collex – Tarago)

- Even in small-unattended country landfills, when all costs are included the true cost per tonne is around $60 to $70 per tonne. This price will only go up! (South East Waste Board 2001)

- In the ACT, which adopted a "No waste by 2010" in 1996, they now have 300 jobs in recycling generating $12 million per year in wages – trickled down through the economy this generates around $36 million – add to this the savings in recovered resources and saved landfill and the total value is at least $60million. ----- The ACT only invests $5 million in recycling programs each year for this $60 million return!! (ACT)

- The national fertiliser bill at the farm gate in Australia is in excess of $4 billion every year. (CSIRO - 1997) Every tonne of organic material returned to agriculture will reduce this fertiliser bill.

- Much of this degradation and structure loss in Australian soils is caused through falling levels of soil carbon and micronutrients. These in turn cause reduced microbial activity in the soil – the very activity that releases nutrient to the plant.

- Research in 1997 by Anthony Ringrose-Voase of the CSIRO in Wagga, Australia clearly demonstrated that the falls in the levels of organic material is soil are directly attributable to decreases in the value of both crops and farm land. For every .1% of organic carbon lost from the soil the farmer loses $11.60 per hectare in the value of the crop and $79 per hectare in the value of the land. This process is entirely reversible by putting organic carbon back into the soil.

- Everything we do, everything we export, relies on the quality of our soil and its ability to produce. In the state of New South Wales, 70% of the land is affected by at least one form of land degradation; almost 30% is severely to very severely affected. (State of the Environment NSW 2001)

Project Description

The majority of projects associated with the management and recycling of wastes are focused on problem solving, diverting material from landfill and the costs associated with solving the problem.

This project is also focused on diverting material from landfill, but with the added incentive of providing increased benefits through agricultural use of the end product, providing additional wealth, which is then provided back to the participants in the system.

The agricultural benefits of using quality organic material in agriculture are:

- Increased yield
- Improved crop quality
- Reduced water use
- Improved water efficiency
- Improved soil structure
- Increased microbial activity
- Reduced nutrient leakage
- Reduced fertilizer costs
- Reduced erosion
- Carbon sequestration
- Increased land value

This project commenced in February 2003 with an initial request from Greater Queanbeyan City Council for assistance with the development of markets for recycled organic products.

The council green waste collection and composting service had been found in a previous study to be cost neutral, due in part to such factors as lower costs for upkeep of the Council's own garden and park assets and reduced disposal to landfill.

A trial on the property "Mooncoin" was commenced in March 2003 to investigate the effects on soil properties, yield and moisture retention, using various applications of organic and inorganic material as treatments. The commercial value of these effects to the farmer is of principal importance in marketing the product. A separate report on the research outcomes has been completed for the "Mooncoin" trial.

Concurrently, a document released internally by the Department of Environment and Conservation outlined a number of potential benefits with using recycled organic products. This document, "Life Cycle Inventory and Life Cycle Assessment of Windrow Composting Systems" is now available through the Department of Environment and Conservation web site.

The "Mooncoin" trial was designed within this context to pursue broader principles of sustainability, and to expand upon the idea that recycling of organic material has benefits and value to agriculture and the community beyond the saving of landfill costs.

To deliver these benefits it is necessary to produce a quality uncontaminated composted product. Free of Glass, plastic and metal. To produce an uncontaminated product requires clean, source-separated materials as an input. This therefore required a collection system to be developed to address contamination in household collected green waste bins.

The council already has reactive and educational measures in place to address contamination in green waste bins, but some considerable effort is still required to remove contamination after the material has been collected. The project named “City to Soil” attempted to address this issue upfront, by engaging with the source: The householders, who do the separation.

A householder directed information campaign, before and after attitude surveys, and contamination audits were undertaken in an effort to bring about and monitor any changes during the trial period. The project was confined to a discrete area of Queanbeyan of some 800 households. Minor modifications were made to the collection system to identify complying and non-complying bins, and to deliver rewards.

The data collected from the trial indicates shifts in attitudes and concepts, and contamination was substantially reduced.

A benchmarking study for recycling and waste in Queanbeyan was undertaken to further highlight the benefits of the practice in economic terms. This demonstrated considerable financial benefit for the farmer.

This project demonstrated that it is possible to take some part of the total financial value generated by using quality composted product in agriculture and to return it to the householder to ensure that organic waste bins, put out by the householder, are contamination free.

The first stage of this project, the agricultural trail on the property “Mooncoin” was commenced in February 2003. The collection and rewards elements of the trial were completed in June 2004.

Aim

This project sought to demonstrate that falling levels of organic materials in agricultural soils could be addressed in part by engaging the rural and urban communities together in a trial, which sought to increase soil health by returning quality composted product to agriculture.

Increased soil health brings benefits to the farmer by increasing yield and income and to the broader community by ensuring agricultural sustainability for future generations.

The project aimed to minimize alterations to existing systems in collection, processing and on-farm application. Using very simple bar-code technology and rear loading vehicles, a householder credit system was devised, which reduced contamination by 40%.

This in turn, lead to cleaner, compost product with more direct application for the farmer, with no concern for contamination.

Innovative aspects

This project is unique, in that using simple existing equipment in collection, processing and product delivery, it resulted in a process that rewards all participants in the system.

The “City to Soil” project was designed as a model, which could be modified and remodeled to suit any regional, rural or urban center.

The project used a low-tech approach to collection, processing and delivery. It uses standard hand-held scanners to record the bin bar code of any household, which has placed a bin, free of contamination on to the kerbside

The main innovative aspect of this project is that identifies all the financial benefits of applying quality organic material to agriculture and then returns part of that value to the household for source separation of the product in the first place.

Cost/Benefit

The cost of landfill for general waste in the region where the trial was conducted, near Canberra, Australia’s National capital, is $77 per tonne. The cost of disposal of waste to landfill for Sydney varies from around $100 per tonne up to $150 per tonne.

Yet it is possible for a commercial processor to manufacture quality compost to Australian Standard AS4454 and carry the product at least 200 klms in any direction for a cost of $50 per tonne.

This means that the product can be delivered to the farm gate for less cost to the community than disposal to landfill.

As this trial demonstrated however, when the farmer applied the product in his vineyard, his productivity in the trial area increased dramatically.

In the cool climate wine area where this compost was applied the sale value of the grapes on this vineyard was approximately $1300 per tonne. In the trial area the application of compost at a rate of 10 centimeters depth gave an increase in yield of 230% - a value of more than $17,000 per hectare.

Given that these wine grapes were young, it is still expected that long term the grapes would still have produced an increased yield of at least 40% for 10 cm of compost.

This would mean that if the farmer paid a rate of $30 per tonne for the compost, the application cost would have been around $900 but it would have returned a profit of $3900 or a net profit of $3000 per hectare.

The sale value of the compost can be returned to the community as community rewards and prizes to encourage clean, source separation of household product.

This project uses the same funds, which were previously used to landfill organic products to return them to useful function within agriculture. At the same time it generates profit and reward for all who participate.

This project is about the triple bottom line of social economy.

Replication Potential

Farming is a mineral extractive industry. It takes between 60 top 90 elements, minerals and nutrients to grow a plant. Yet where chemical farming is practiced many farmers now only return three chemical nutrients to the soil. All soils will progressively suffer from this slow degeneration process. The extraction process can also affect the organic levels of soils, reducing the materials on which soil biology lives and thus slowly killing the soil.

This project is not about putting companies out of business. It is about having people in the waste and fertilizer industries transport and sell a different range of products.

As a national community we must resolve to change to more sustainable methods of agriculture and as we do we must demonstrate that farming can be sustainable and that it can involve the entire community.

The “City to Soil” model will fit into any community. It will broaden the market to include not only the fertilizer companies, but also the farmer and the general community, engaging them all in sustainable food production.

City to Soil Benefits

Environmental	Cost/Benefit	Farm	Social
• Reduced waste to landfill • Reduced run-off and contamination from landfill • Reduced methane from landfill • Reduced weed dumping in public spaces • Environmental collection benefits of kerbside, rather than household to landfill	• Compost can be made and transported to the farm for less cost than disposal to landfill • On farm benefits provide $ input value for community rewards • Cost savings on fertilizer • Better return on investment for community waste handling dollar	•Increased yield •Reduced water use •More efficient water use •Improved soil structure •Increased microbial activity •Reduced fertilizer costs •Reduced erosion •Carbon sequestration	•Urban-rural soil and food relationships •Community Education •Community buy-in • More jobs in every rural and urban community • More on-farm employment distributing product •Increased business activity in recycling •Ties directly into Sustainable Schools program

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