

# Redeeming Waste

## Organic Household Materials an Untapped Resource for Regenerative Farming

BY GERRY GILLESPIE

In the region where I live, in the tablelands of New South Wales, many of the soils have been abused through the use of European agricultural systems and the desire for immediate profit in preference to long-term viability. I do not mean to say that this agricultural abuse was intended – as in most colonial expansions around the world, local indigenous practice was not considered, and whatever happened in the home country was put into practice in the new place.

As a result, though, we have extensive areas of land that were poor prior to the arrival of the Europeans and an even larger amount of land that has been abused into biological impotence. Living in the midst of such a landscape, it seems a relatively simple concept that this country would benefit from an increase in soil organic matter. Extending this a little further in the pursuit of pos-

sible sources of soil organic matter, it quickly becomes clear that one of the largest sources of organic material in this part of the world is what we often classify as waste.

The waste industry as we know it today is a relatively new business in terms of its size, financial base and physical processes. The great majority of materials management was previously handled within and by each community. Today's model, in which giant cartels run contracts worldwide, is the product of shareholder profits. With a total focus on collecting as quickly as possible and on reducing any possible impact to community health, the industry has never in recent history taken much interest in the potential beneficial uses of organic waste. Also, it is not in the interest of the waste industry to make any part of their process simple. As previously noted, the more you mix materials together before you collect them, the more expensive it becomes to pull them all apart.

The importance of removing organic waste from urban situations to improve human health was realized in the late eighteenth century. As communities grew, more organic material was needed on farms to produce food and increasing quantities of urban organic materials began to be transported back onto the farms.

However, in the nineteenth century, the work of the chemist Justus von Liebig and others demonstrated that crop production could be increased by the use of chemical fertilizer. In spite of the best efforts in the twentieth century of Sir Albert Howard, Lady Eve Balfour, Rudolf Steiner, and many others who supported biological processes, the profit-focused economy and chemistry, overrode common sense and



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scientific fact, and humanity began its ongoing work of soil degradation, erosion, land abuse and declining nutrient values in our food.

More recently, when organic collections specifically for composting were developed, the focus was still one of simplistic waste management. The concept of higher standards for compost, in an attempt to remove poor-quality products from the market, made a difference. However, the waste and recycling industries have not put a great deal of thought or science into what alternatives may be possible to maximize the value of processed organic product – to use another methodology or process, to take it to another level, and to make something other than compost from organic waste. The same is true of all other materials regarded as waste. Very seldom do you find individuals in the industry who ask, “Is it possible to make something of more value from this product than what the product originally was?”

In addition to these issues, standards – as opposed to process –



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became confused in the minds of some in the compost industry. It was deemed that the only way to reach an approved standard was by using a very specific process. The concept of standards also confused regulators, and the objective of end-product quality became confused with how you got there. The modern waste stream is very different from what it was sixty years ago. Much more is discarded today. Our waste insanity is in part driven by the unthinking political obsession for a continually growing economy, based on a model of perpetual waste and continual renewal. It was a common economic understanding in the 1990s, and perhaps still in some circles today, that a very wasteful society is an economically successful one. If we waste enormous tonnages of goods and food and have to replace them daily or weekly, it was thought, then our economy may be functionally perfect. Alternate models of economic efficiency that constantly reuse and remanufacture – the concept of a “circular

economy” – have only just begun to resonate; they have not as yet reached into the current vacuum of political thought. The problem with our current economic model is that it requires a constant drawdown of the earth’s finite resources – a structural model that cannot be sustained in the long term. Even the clever concept of a circular economy is still just a phrase. It is not yet understood that any two products in such a system might be able to produce a third, more valuable, one.

We seem incapable of looking at materials and products in discard streams in their elemental form and considering what new and innovative things could be made from them. A fine example of this, regardless of the circumstances, is that composting is generally seen as a waste reduction technique – few people see it as a value-adding process. Composting is process through which a highly valuable, functional, biological product can be made; when applied at almost miniscule levels it can greatly improve the

nature of soil. The waste industry looks at organic waste as it does all other materials, though: as a principal profit center that is collected in one large bin, mixed with other materials, and sorted in a large facility. Such facilities are often called “dirty MRFs”; they have never been successful, and they generally produce a poor-quality organic product that most farmers would refuse to have on their land. In fact, the government of New South Wales has just made it illegal to use such material on farmland or at old mine sites. It is with a suspicious mind, however, that one might consider that the incineration industry may have pushed hard for this outcome, so that they can now say that all organic materials should be burnt! This outrageously expensive and mindless destruction, when our soils are in desperate need of organic materials, must be battled at all costs. We need to be constantly searching to return materials to the natural cycle, the same way nature does. Our processes should reflect this.



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## PROCESSES

If paper and cardboard are included, organic waste can comprise up to 70 percent of material streams disposed of as waste; in some instances, this number can be even higher. The greatest disadvantage of organic waste is that if even a small percentage of it is food, this generally contaminates the rest of the materials. So the best method is to ensure that food is not mixed with other materials in the first place. Source separation is thus the key to successful and profitable management – not only of organics, but of all materials. There are many options for the processing of organics. One process, or a combination of processes, can be used to change the nature of the product to a different form. A solid can be converted to compost, and compost and other high nitrogenous waste can be converted into worm castings. A solid can be converted to biochar and mixed with biology to greater effect. Foods, including meat, can be converted to a liquid biostimulant hydrolysate that can be used to replace fertilizer. This means that a solid can be converted to a liquid that has a much higher stimulant value to a plant than the original material.

The first requirement is to identify the maximum value that can be obtained from the product and where you intend to use it. Can it in fact be made into a product of higher value and quality? What is the cost of the process? Is it better to simply mulch the product for general use? What is the optimum use of that product, given a specific cost? What are the implications in regard to regulations? The opportunities in Australia for reuse of organic waste are extensive because soils are very low in soil organic matter; the beneficial uses of organic materials as mulch or compost for council projects, for the community, and for businesses are extensive. The largest opportunity, however, is the potential to connect the community back to the soil through the collection and reuse of their organic waste. Councils use a lot of soil and mulch products in landscaping. Most of the time this

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product is purchased from outside suppliers. The question to ask is, "Can the output you have be used as a replacement for something that someone else is currently paying for?"

The proper application of any organic material that has been processed to be biologically active can decrease chemical input requirements and increase soil organic levels and soil carbon. It must be remembered that any collection, transportation, and processing system must comply with regulations and standards. Nevertheless, it is not that difficult to comply, provided you select the appropriate processes. Check with your local environmental protection agency in regard to

regulations and exemptions before you or a local organization make any decisions or any commitment to purchase equipment for a specific process.

Organic waste can be treated by one or more of the following means:

- Composting with an aerobic process
- Composting with an aerobic and a fermentation process
- Processing anaerobically to generate gas, which can be burned to yield heat and power
- Mulching
- Vermicomposting (worm farming)
- Maceration and inoculating to create a foliar fertilizer
- Fermenting to create a hydrolysate
- Manufacturing an emulsion to use as fertilizer or foliar spray
- Shredding to capture proteins or create fertilizer
- Wood pelletizing for energy generation

## FOOD WASTE

One of the important issues associated with wasting food is the amount we purchase. A great deal of the organic material we throw away in the developed world is due entirely to over-purchasing and poor storage.

Governments, both local and national, are beginning to appreciate that the removal of food waste from waste collections directly impacts the quality of residual collected materials. Separation removes the "yuk" factor and greatly increases the commercial value of the remaining resources. Most people have not yet begun to appreciate the value of that product when put to beneficial use in food production. There is still the unfortunate concept that we are dealing with a low-value product, that what was done in the past is always the best option.

Depending on the application of relevant local regulations, food waste can be processed through a diverse range of methods, some of which can produce energy and end products to enhance soils and long-term food production. Of course, one of

the best uses for food organic matter, like other materials, is right at the point where it becomes wasted. If you have soils into which it can be buried directly, or if you can process it into a foliar spray or a compost, all the better.

The quantity of organic material in most commercial hospitality waste streams is greater than 50 percent of the volume and bulk of material outputs. While waste reduction is an important issue, the costs associated with the collection and disposal of this output are increasing rapidly. And in most instances this waste can provide sufficient offset to pay for the costs of collection and the costs of processing. Indeed, with the correct balance in terms of nutrient and microbial activity, it is a very valuable replacement fertilizer product. The ability to generate and quantify the beneficial energy and possible agricultural products produced as a result of these organic collections has yet to be fully researched. Indeed, the disparity of local relevant regulations is so vast as to warrant the identification of alternate processes used for compliance purposes. The common point in all instances, however, is once again the need for an effective and efficient source-separation process to ensure both good quality and highest end-use. There are existing successful models such as the Cleanstream brand, which was registered in 1998 in Wales and adopted successfully by Gary Kelk on Waiheke Island, New Zealand. In addition, there is the existing City to Soil client-engagement process, which provides the right tools, information, and motivation to achieve very high source-separation standards.

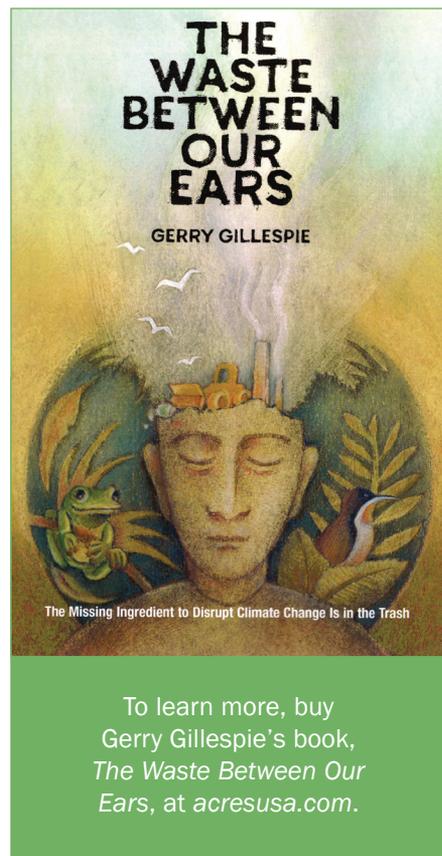
In the UK, the Animal By-Product (ABP) regulations mean that food waste must be processed in such a way as to ensure community safety, following the concerns regarding BSE (mad cow disease). This means that in terms of immediate processing, the principal available option is processing through an Anaerobic Digestion (AD) plant for the generation of energy and later application of the resulting digestate to land. Any other process such as maceration or com-

posting would need to demonstrate, through evaluation and testing, a reliable and consistent regime before such a process would be licensed under the ABP regulations. Alternatively, if a collection and processing system were used in a country where ABP-type regulations were not applicable, it may be possible to develop a business model incorporating appropriate testing and evaluation that could be implemented in other communities around the world.

### THE HUMAN DIET AND CONNECTIONS TO SOIL

Those who pursue a fast-food, Western diet are in the middle of a food crisis. This is in part evidenced by the number of people who are grossly overweight in Western society. With these excessively fat and unwell people, eating poor-quality food, we are rolling toward a medical and diabetic crisis that will cost the world community much more than money. Farming techniques and the overuse of chemical fertilizer have ignored, at the expense of human health, the fact that plants require between sixty and ninety minerals, nutrients and trace elements for healthy growth. Most industrial farming processes apply only three of four of these. Vast numbers of people are becoming aware of the falling nutrient content and general quality of our foods, which is directly related to the imbalance of nutrients in fertilizers. This increasing awareness of food quality is demonstrated by the number of people who are now getting their food from farmers' markets, Community Supported Agriculture (CSA) programs and community gardens. Home gardener advisory groups and numerous small businesses designed to help gardeners are also popping up—further evidence of the desire for change in food production.

On top of this, to support their goal of reducing the amount of waste going to landfill, local government agencies in some communities have begun developing food and yard waste diversion programs. Unfortunately, these activities arise not from a desire to improve soil quality but



from a waste-management perspective. If real change is to occur, it must be driven by a more holistic and long-term perspective.

In the few instances in which these food-waste diversion programs have delivered community engagement programs focused on improving soil quality, food production, and an awareness of healthy food, the response in high-quality source separation has been remarkable. In examples like the City to Soil program, delivered with a story that connects people back to the soil using the right tools, motivation, and information, we have seen very high participation rates and very little contamination in organics bins. The City to Soil program attempts to reconnect individuals to the soil with a focus on human health. The message is simple, and the response is strong. This innovative program also delivers into the hands of the community the political power to make change happen. The awareness of this issue and the use of the high-quality, source-separated, uncontaminated product delivers back to the community the tools to

help change the food production system. It demands that policies be put in place to fundamentally change what we produce and eat.

### **PROVIDING THE WHAT, HOW, AND WHY**

There are many decisions to be made before a materials collection system can be implemented. These include where and what will be collected, what sort of vehicle will be used, what sort of processing system is needed, if an MRF of any sort is required (it won't be if you are source separating), if a composting site will be necessary, and what regulatory standards will need to be met and with what licenses. In the midst of all this is the most important element: the engagement process. How will the people implementing the system communicate with the public who will be placing materials out for collection? It is crucial that people understand what is required of them and that they are interested and have the right tools, information, and motivation to do the source separation.

The method of collection, including the bin and the vehicle chosen for collections, affects the effectiveness of the entire process. It is important that the collection system suits the end use. Clean, undamaged and uncontaminated product can mean better quality and quantity of product, and therefore better prices. Collection systems in Wales, in which materials are source-separated into bins by householders, means products are placed into the collection vehicle by hand, with little or no breakage and almost zero contamination. Rather than investing in huge and expensive trucks and an expensive and complex MRF, the investment can go into people and jobs and a very simple storage facility. Many recycling programs are dealing with high levels of contamination. This can be a fault, in part, that is built into the system design. If paper, glass, bottles, and plastics are all collected in the same bin, then compacted into a side-loader vehicle, damage to collected goods is inevitable, as are lower prices and poorer quality of the end product.

The success of recycling collections around the world is predicated on the amount of contamination present in the collection container. There are different collection systems, different collection containers, different collection vehicles, and different collection objectives. In other words, if you are only collecting paper, you don't want glass mixed in; if you are collecting bottles and cans, you don't want food in with it. If you are collecting food, you don't want glass, and if you are collecting organic waste – or yard waste mixed with food – it needs to be very clean so it can be turned into compost to use in gardens and farms. When designing a collection system, the “what” is the type of material to be collected and the “how” is the type of collection vehicle. The most important element, however, is the “why.”

In 1992, I was employed by the Australian Capital Territory government to oversee the community engagement strategy for a series of trials to evaluate a curbside recycling system for Canberra. I had previously been involved in a printing and publishing business in which the focus was often on how businesses stood out from their competitors – in other words, I advised businesses on why people should contract them in preference to others. The overarching branding developed for the trial, by local designer Carolyn Brooks, communicated to the participants why their involvement was important. The look and feel of communication needed to be very different to anything in use at that time in recycling in Canberra yet connected to existing programs. At the same time, it was crucial that people involved in the trials were made to feel proud of being leaders in recycling, not only in Canberra but in the world. They were pioneering a new system that would have the potential to create a new recycling model both for Canberra and for Australia – which ultimately it did. In the communications with homes in the trial area, the public was again informed, most importantly, why the recycling trial was being conducted, what was to be collected (bottles, cans, plastic



Compost profile.

containers, paper, and cardboard), and how it was to be collected (by a side-loader vehicle).

In 2003, while working for the New South Wales government, and again with designer Carolyn Brooks, the same “what, how, and why” approach was taken with the first City to Soil yard waste trial. The engagement strategy was clearly worked; contamination rates were well under 1 percent in most instances. When a larger four-council trial collecting both food and garden organic waste was commenced in 2007, the same engagement strategy resulted in a contamination level of around 0.4 percent.

Marketer and author Simon Sinek, in his 2009 publication *Start with Why*, confirmed that a strategy that first explains why you want people to act in a specific way or to buy a specific product works. He gives the example of Apple computers, which first tells the consumer the “why” in their product: that “everything they do challenges the status quo – that they believe in thinking differently.” Their “how” is the elegance of their computer programming, and their “what” is that they make great com-

puters. This same strategy for the introduction of City to Soil in the City of Armidale in New South Wales resulted in a very similar outcome of almost no contamination. Remember that a good engagement strategy is the key to low levels of contamination in any recycling program. I would argue that City to Soil is successful primarily because its engagement strategy gives the usual “how” and “what,” but with a clear focus on the “why.” City to Soil has demonstrated – in accordance with its tagline, “Be Part of the Solution” – that people will get involved in recycling programs as long as they understand why they are doing it.

### ORGANIC WASTE AS THE POINT OF ENGAGEMENT

Much of the story of greatest importance to humanity – the story of soil and its effects on our food supply – seems to have been lost in the economic and disjointed babble of production, process and transport. There has been more than enough written to explain to us in great detail the mistakes we have made worldwide with soils and food production. These include the overuse of chemicals to increase production and control pests and disease, the connections between poor diet and health, the consequences of poorly researched genetic modification and disease epidemics, and the obesity plague associated with processed foods from such production techniques.

Over the past forty years, warnings on the quality and nutrient value of food have become more persistent and the sources alarmingly varied. Humanity needs a connection back to soil, driven by an understanding of the need for clean, quality food. Such a connection at a broad level would provide communities with the collective political power to enable us to force change in our food production systems. The steady increase in farmers’ markets, the demand for locally produced food, the focus of the community on organic food, and biologically grown fruit and vegetables and free-range meats are all indications that communities are prepared—in-

deed, they are searching—for better-quality food. To reconnect the community with the soil as its mother, we need a point of engagement.

I believe that this point of engagement is organic waste, and I know from the community response we have had to date that people do understand the importance of quality food and therefore the need for quality soil. This is not only a very sound and logical argument, but it also provides a very strong and resonating “why.” As we face the potential food and soil crisis in Western society, acknowledging that the public must be part of the solution, City to Soil demonstrates that the access point for public engagement is both cheap and available. Its management is already paid for and its availability is unquestioned. To enable the use of organic waste in this important role, we need to review what it is we are doing with waste, what others are doing with waste, and where we might take the issue for the benefit of the community. We must take on the management of waste as a community tool for local

economic benefit and employment.

There may not seem to be sufficient organic waste from households or businesses to make a substantial difference to the amount of soil organic matter in agricultural soils as a whole. But every human on the planet, if they are eating regularly, will produce organic waste every day, and the benefits of this waste depends on how it is applied to the soil. There is sufficient organic waste from every human to allow them to engage in the process of soil restoration and food protection in their immediate vicinity. We have been able to demonstrate on numerous occasions that people will respond to a request to engage in the process of source-separating organic waste. A community engagement program must be structured in such a way as to enhance the message of soil protection and to reinforce the need for quality food.

This article was excerpted from Gerry Gillespie’s book *The Waste Between Our Ears: The Missing Ingredient to Disrupt Climate Change is in the Trash*, published by Acres U.S.A.

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