

When the statue is both marble, and lime

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Although many of the chapters in this volume focus on a single class of object or material, it is clear — from the systematic recycling of materials from villa sites discussed by Munro in this volume, to the modern disassembly of ships in Bangladesh² — that recycling and reuse activities frequently occur together, regardless of the material in question, or its provenance. We originally envisaged the conference as a way to bring together researchers investigating recycling and reuse, and to share methodologies and theoretical approaches, but it quickly emerged that bringing together different materials, often from very different social contexts, is simply what recycling *does*, and what it has always done.

The chapters in this volume have been collected, disassembled, sorted, and repackaged — first at the conference itself, and later through the review and editing of the texts — to form something new; an important first step in untangling the complex social, economic, technical, and cultural factors behind Roman recycling and reuse. The picture we can currently offer of Roman recycling and reuse is necessarily partial, but it is also profoundly important for wider understanding of Roman society, economy, technology and culture, not least because it stems from the fruitful exchange of ideas between researchers working in a range of fields relating to these topics. This volume belongs to a series on the Roman economy, but recycling and

¹ This chapter stems from the discussion session held at the end of the conference upon which this book is based. The authors were the panel members, with the addition of David Mattingly (panel chair), and Chloë Duckworth (organiser and main author). The chapter is the outcome of a vibrant, multi-vocal discussion to which all contributed a great deal. There was also a significant contribution from the audience, which included the authors of papers presented earlier in the book, and many unnamed attendees.

² Gregson *et al.* (2012).

reuse are embedded in social and cultural factors too, and may be constrained or enabled by technological ones. In what follows, we sketch out some of the more prominent parts of this emerging picture, and make recommendations for the future.

Recycling and reuse in the *chaîne opératoire*

We have attempted to produce a general flowchart for the *chaîne opératoire* of recycling and reuse, that situates these activities within the broader economy of production and consumption (Fig. 15.1). The familiar, linear picture of extraction, production, consumption and disposal is challenged by the added complications of considering by-products and interventions at different stages, to reuse, maintain (including repair), or recycle materials and objects moving through the flow. The ‘black box’ of consumption in our chart is exploded and termed ‘productive consumption’, to recognise the ongoing labour of maintaining things after acquisition.

<Fig. 15.1>

Recycling implies breaking up an object for its constituent elements, or melting it down. Either activity demands an initial energy input — an ‘activation energy’, to use a chemical metaphor — and this serves more or less to restrict what objects can be recycled, and by whom. Reuse does not typically require the overcoming of this initial energy barrier, though it may require the crossing of cognitive barriers (e.g. recategorization). Repurposing may be seen as a variant of reuse, and repair as an activity that occurs along a continuum. The archaeological visibility of the different processes varies, with the domestic labour of reuse

being the least visible. There are always exceptions to such rules. Some of the objects discussed by Salmenkivi, for example, were reused in a way that involved a relatively high investment of labour and skills.

The degree of transformation wrought upon the object(s) and materials involved must also play a significant part. In extraction, by-products can be waste or resource, depending upon the context. During production processes, by-products can be recycled in another process, or can re-enter the production pool (for example, waste glass being thrown back into the furnace). Furthermore, the recycling process itself can also create by-products. The concept of ‘limbo’ — raised by Catherine Alexander — refers to ‘objects in waiting’; for example, those stored in a warehouse and not immediately used.

Many variations of the diagram presented in Fig. 15.1 could be made, depending on the waste stream, material, or object in question; on whether reuse of a product is economically viable; whether recycling returns a material to the same, or a different production pool; the urban *versus* rural and industrial *versus* domestic contexts; and the availability of skills and technology. The diagram in its current form does not account for the different lifespans of recyclable materials, with some (e.g. textiles) less long-lived than others (e.g. metals). At all stages in the flowchart or *chaîne opératoire*, we might also consider storage, property rights and regulations, obligations, borders and liminal zones (often the targets of waste dumping, and therefore, scavengers).³

Scales and methods of analysis

The papers in this volume demonstrate that there are many appropriate units and methods of analysis for the study of recycling and reuse, ranging from case studies of the life history of

³ See Balbo (2015); Alexander and Reno (2012).

single objects, to single artefact categories, to *chaînes opératoires*, and assemblage theory. Only by travelling between these categories may we tease out the relationship between the general and the specific.

The investigation of recycling via archaeometry is a balancing act. We are limited in the samples we can access. All techniques require a minimum sample size — some more than others — and very often the traces we are trying to detect are present in very small quantities. When practising destructive analysis, the value of the data generated must be a central concern, weighed up against the damage that will be inflicted. We are also aware of the often rapid progress of scientific techniques, and the potential of the future to offer a wider range of minimally-destructive analysis. On the other hand, when trying to characterise populations, we require statistically viable datasets, and this comes up against financial cost. Isotope analysis in particular is expensive, and yet only expensive programmes of analysis can produce enough results to be archaeologically viable, and representative of a dataset.

The greatest challenge in attempting to integrate our growing knowledge of recycling and reuse practices with models of the Roman economy is that so many of these practices are so difficult to detect. As pointed out in the introductory chapter, quantification is difficult — if not impossible — when the phenomena one seeks to quantify are not always visible. Residue analysis (Brughmans and Pecci), isotope analysis (Degryse, Ponting), and trace element analysis (Ponting, Bray, Duckworth) are all making significant inroads into increasing the visibility of recycling and reuse. In any case, what the papers in this volume have highlighted, across a range of materials, is the commonness of recycling and reuse where we *can* see them, and how deeply this must affect our existing models of economic performance, and of production. The possibility of amphora reuse discussed by Brughmans and Pecci, for example, throws up questions about even our most basic of distribution maps, and the assumption that we can simplistically extrapolate from containers, to contents.

The scale of recycling and reuse also have a significant impact upon our current measurements for the scale of consumption. What the papers in this volume imply is that this may have been grossly underestimated to date, but correcting this poses a challenge in quantification that we are not yet qualified to meet. One of the challenges lies in attempting to determine the number of cycles of reuse. For example, it is difficult to say whether an amphora was reused once, or multiple times, before discard, as discussed by Brughmans and Pecci; or whether the presence of recycling ‘markers’ in glass reflect gradual build-up of contaminants over time, or a single episode of recycling, as discussed by Duckworth.

Labour, organization, knowledge and skills

We might reasonably expect the division of labour to be a function of the scale and specialism of recycling and reuse. The division of labour in the Roman economy was extensive, both into different industries, and into tasks within industries and professions.⁴ Given the scale of recycling and reuse suggested by several of the chapters in this volume, it would not be surprising to find that they were also characterised by a marked, highly organised division of labour. Indeed, many of the sorts of processes that we have seen — particularly the high-energy-input recycling, in which a material has to be disaggregated, or melted, for example — require skills. The people responsible for building the various pyrotechnological structures identified by Sebastiani and Derrick in their chapter on Spolverino (Tuscany), and by Munro in her chapter on recycling at Roman villa sites, had specialised pyrotechnological skills. Peña, in his chapter, argues that the guilds of *centonarii* were essentially *chiffoniers*; a profession specialised in waste picking.

⁴ Wilson (2008b).

We should also consider the merging of artefact and material categories. As one panel member put it, referring to the burning of marble to create lime, ‘there is a moment when the statue is both marble, and lime, and that can be symbolically important’. We might learn a lot by teasing out those particular moments in which artefact categories are merged, and disaggregated; the nodes of recycling practice, as it were. Indeed, recycle may be gathered together and merged in one stage, and disaggregated and sorted, in another. It can be helpful in a given setting to consider the affordances of a material or object; that is, its potential, taking into account material constraints, availability of skilled labour, and so forth.

Property and ownership are difficult to tackle archaeologically. It is easy to imagine recycling as a ‘free for all’, with the resources being available for people to take and make use of, but as Barker points out in his chapter, the reuse of statuary and spolia was characterised by a high degree of organisation, with power and legal concerns also playing a role. In any recycling context, we must ask, who was undertaking labour, and what did it cost? (Slave labour could be expensive, and should not be assumed.) How much profit did it produce, and for whom? Farmers may have been a ready source of labour for some of these activities, so we should bear in mind that they could be seasonal. We must also consider domestic labour and household cycles as a part of our models of the economy of recycling and reuse. Both farming and domestic contexts may bring alternative logics. Seasonal and generational cycles can create intermittent labour surpluses, so that efficiency and the law of diminishing returns become less important in some contexts — and even at some times of year — than others.

We should bear in mind that the organisation of recycling, repair, and reuse may also have been a civil obligation. If a building is falling down, is there an obligation to bring in the demolition squad, and to remove the danger? And what then becomes of those materials? In a large city such as Rome, it may have been cheaper to process and recycle waste materials than to remove them and dump them.

We also need to consider change over time, and the way this played out in different regions. How did the extraordinary degree of standardisation in the Roman labour force, across the Empire, come about? And what happened when that situation went into reverse? Fleming discusses loss of skill in her chapter, but she also considers the way in which cutting off trade links and access to resources had an impact upon the potential of skilled workers to carry out their trade, and whether we can recognise this in the archaeological record. This could happen quite rapidly, in the course of a single generation, or it could be a slower process. Much depends on the region in question.

We are still relatively poorly informed about how specialisms were articulated within the practice of recycling and reuse, particularly the question of cross-craft interaction. We are aware that there must have been relationships between a wide range of industries in which one made use of the by-products of another. The co-location of craft processes is one way in which archaeological evidence can address this, but co-location was not always a prerequisite because, as we know, recyclate could travel long distances. We might compare the co-location of pottery and olive oil production in North Africa, with the evidence from the Pompeii bakeries for the use of olive pressings as a fuel, which were presumably being carted in from nearby farms.⁵ For pyrotechnologies, we tend to see separate furnace structures for glass and metals, as discussed by Munro, and by Sebastiani and Derrick, for example, but this does not rule out a high degree of cross-craft interaction between glassworkers and metallurgists (assuming they were not the same people); it simply responds to the different needs of the material. With pyrotechnological recycling activities frequently occurring in such close proximity to one another, there is no reason to assume that high-temperature recycling required a different specialist or group of specialists for each material. This

⁵ Co-location of kilns and presses: Leitch (2011: 172–3); Wilson (2012: 150). Pompeii: Monteix (2009). On olive pressing waste used as fuel generally: Rowan (2015).

potential for shared knowledge between craftspeople is something that archaeologists have been very poor at recognising to date, albeit with some notable exceptions.⁶

Value

One of the core arguments of this volume is that, with the growing wealth of evidence for Roman recycling practice, we need to adjust our focus away from the ‘knee-jerk’ assumption that recycling was something that happened only in late antiquity, and that it was primarily, or solely, a response to lack of resources; even to crisis. What drove recycling and reuse in the high Roman period? Did they stem from a shortage of new material (which could lead to a whole range of material engagements),⁷ or were they preferred as cheaper, more profitable alternatives? If the latter, did they in some instances *diminish* the effort to extract new materials?

As ever, there are a multitude of answers to these questions, depending on when and where we look. Recent work on the sub-annually resolved, 3,000-year record of atmospheric lead pollution from Greenland ice shows some remarkable coincidences with Ponting and Butcher’s identification of phases of the production of silver *denarii* from new metal, and from recall and reminting of old coin. For example, there are marked drops in the atmospheric lead in the late first century AD, coincident with periods of recycling identified by Ponting and Butcher, and marked peaks in periods in which new metal was being used for the silver *denarii*.⁸ Of course, we do not yet know to what extent shortage, or problems at the mines drove recycling, or whether it was the recycling practice that meant the mines did not

⁶ For example, Rebay-Salisbury et al. (2014).

⁷ On the material engagements that can arise due to shortage of material, see Gerasimova and Chuikina (2009).

⁸ Butcher and Ponting (2015); McConnell *et al.* (2018: 5728).

have to be so intensively exploited. This sort of ‘chicken and egg’ problem is rather common in the study of ancient recycling.

We must also explore social value. The study of conspicuous display and consumption is a well-trodden path, but thriftiness can also be valued, along with skill and affect, and most certainly was in many time periods. Perhaps the ‘make do and mend’ attitude should be seen as the norm for most pre-industrial (and many post-industrial) societies, but such assumptions must be heavily context-dependent, and require careful scrutiny. Wild rightly points out in his chapter that a ‘make do and mend’ mind-set is ‘the complete antithesis of the consumerism which some scholars have detected in Roman contexts’. In any case, there is no ‘one size fits all’ option for Roman society, and thriftiness is likely to have been more highly valued by some social groups than it was by others.

Similarly, did recycled and reused objects have a greater, or lesser perceived value in society than new ones? Of course, for some categories of object, particularly personal ornaments that may have incorporated symbols of something else, then we may see upcycling — the addition of value through reuse — and it could be argued that a similar phenomenon was occurring in *spolia reuse*, where a conspicuous attempt was made to display material recovered from earlier buildings in a particular way. Nonetheless, there is no fixed set of rules for this. Swift’s paper demonstrated that in some cases, value was redefined by reuse with the slate wiped clean, and not carried forward from the object’s previous context.

These questions of changing value are more elusive for our transmutable materials, glass and metals, though some textual evidence may be illuminating. Ponting and Levene present evidence for recycling in the Mishna, Tosefta and Talmud, and compare them with chemical and archaeological evidence, to show that Jewish purity laws were deeply embedded into first

century AD metal supply and a ‘very careful and aware culture of recycling’.⁹ In this volume, Duckworth discusses a possible late antique taboo around the recycling of church glass, lest materials sanctified by use in a church become defiled by recycling for baser uses. Conversely, in the seventh-century *Life of St Theodore of Sykeon*, there is an incident in which Theodore sent his archdeacon to purchase a silver chalice and paten from a silversmith at Constantinople, but when the vessels were used for communion in Theodore’s monastery, they turned black. Upon making enquiries of the silversmith, the archdeacon discovered that the cause was because they had been recycled from the chamberpot of a (clearly expensive!) prostitute.¹⁰

...So what?

We need to stop considering recycling and reuse as uniquely late antique phenomena — the products of a declining economy — and begin to take them seriously, for the first few centuries AD as well as the periods in which they are more visible. Once they are accepted, we must define their character, and determine whether they differed (and how) from late antique practice. Recycling and reuse must be factored into models of production and consumption, as we reconstruct them from archaeological deposits. We must also be more aware of the fact that these practices may have removed significant quantities of material from the archaeological record.

As we become increasingly aware of how common recycling was, we can start to rethink our interpretations of other phenomena, such as the enormous discard pile of amphorae known as *Monte Testaccio*. Were these olive oil amphorae deliberately smashed and discarded because

⁹ Ponting and Levene (2015).

¹⁰ *Life of St Theodore of Sykeon*, ch. 43: conveniently translated in Dawes and Baynes (1977: 117-18).

they bore state control marks, to prevent fraudulent reuse?¹¹ There is no consensus on this, but it is worth considering why on this occasion it was not decided to recycle (for example into *cocciopesto*, or as aggregate in building construction) or reuse (re-pitch) the materials. Why do we have this example of discard, and why do we lack similar piles of other amphora classes?

There is much potential for more broad-scale modelling of recycling and economic practice, considering different background situations that partly structure the amount of recycling and reuse taking place. One aspect to be explored is how the size of the economic world expands and contracts over time, and the opportunities this provided for recycling and reuse in the ancient world.

Given that the study of recycling and reuse has yet to realise its full potential, and given the cost of undertaking scientific analysis, it is worth asking which questions we choose to focus on at this stage. One way of delineating the study of these phenomena is through contrasts, between rich and poor, urban and rural, and between different regions. The contrast between urban and rural activity is a theme in several of the chapters in this volume, and is worthy of further consideration in the future.

We may look forward to the development of new scientific techniques, and it is common to end a paper or a book with the hope that new techniques will one day improve our ability to answer whatever important archaeological question is at hand. More immediately, however, we need to formulate the question well, and choose the materials and methods best suited to addressing it.

Finally, we should not lose sight of the potential to be surprised. So much of what seems logical is turned on its head by the study of recycling, and this is as startlingly true of the

¹¹ Wilson (2008a: 187-8).

recent past as it is of the ancient world. The familiar model of global economies is based on resource extraction from the current or former colonies or peripheries, with value added in the West before being sold back to markets. But this is upturned when we examine the colossal global trades in recyclates. Now the West becomes a source of secondary raw materials for rapidly developing economies in what was once called the Global South. Here, value is added through cheap disassembly, and a ready market (e.g. construction) is on hand to buy sorted materials and newly-remade goods.¹² For now, as for the ancient world, recycling and reuse are fundamentally important processes in the economy, and cannot be seen as simply a passive reaction to economic change.

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¹² Alexander and Reno 2012.

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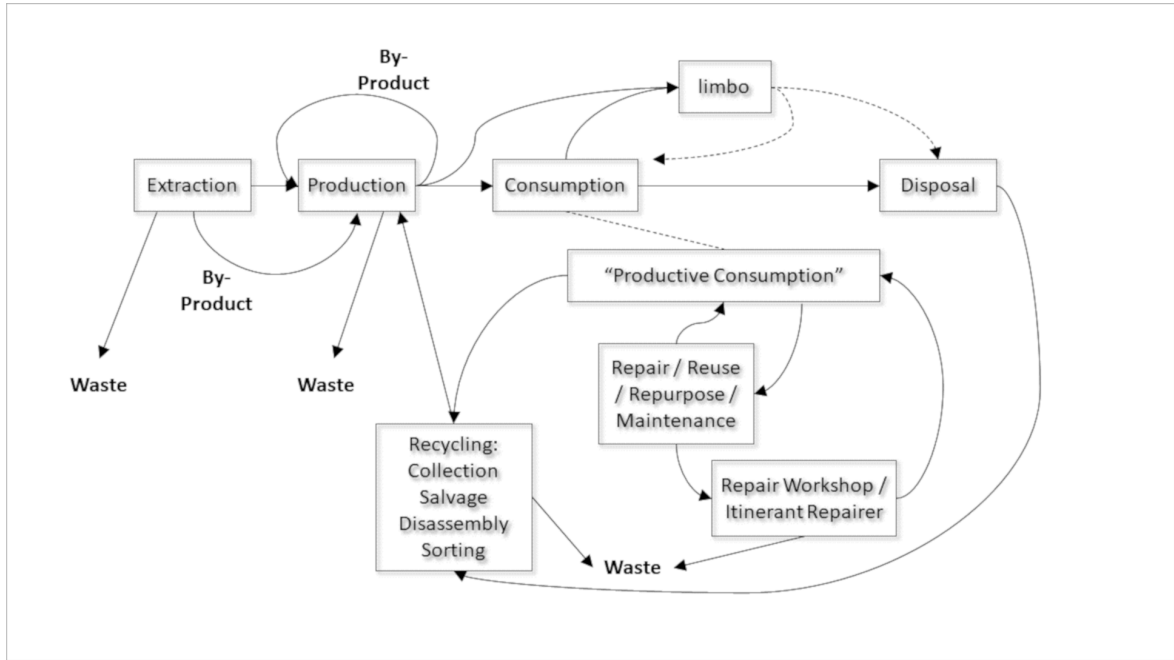


Fig 15.1