

Nothing goes to waste: sustainable practices of re-use among indigenous groups in the Russian North

Laura Siragusa¹ and Dmitry Arzyutov^{2,3}



In the last few decades, the literature on waste has soared and taken two main directions. Considering the assumption that waste is a natural category, which we need to ‘dispose of’, the scholarship on waste management and its sustainability offers mainly problem-solving propositions (e.g., the 3Rs proposal—re-cycling, re-using, and reducing—or ‘circular economy’). The social scientific waste studies literature takes a more critical stance from its outset and advances a relational account of waste. We aim to bring those two main research streams into dialogue through a presentation of two case studies among indigenous communities in the Russian North. Not only we disclose the hidden biases of the notion of circular economy and other ‘innovative’ problem-solving practices in the waste management literature, but we also propose to pay more attention to non-hegemonic waste practices amongst communities, which are often overlooked in both the waste management and the social studies of waste literature.

Addresses

¹ University of Helsinki, Faculty of Arts, Unioninkatu 40B (620), 00100 Helsinki, Finland

² KTH Royal Institute of Technology, Division of History of Science, Technology, and Environment, Teknikringen 74D, 10044 Stockholm, Sweden

³ Peter the Great Museum of Anthropology and Ethnography, Kunstkamera, Universitetskaya Embankment 3, 199034 St. Petersburg, Russian Federation

Corresponding author: Siragusa, Laura (laura.siragusa@helsinki.fi)

Current Opinion in Environmental Sustainability 2020, 43:41–48

This review comes from a themed issue on **Indigenous conceptualizations of ‘sustainability’**

Edited by **Pirjo Kristiina Virtanen, Laura Siragusa and Hanna Guttorm**

For a complete overview see the [Issue](#) and the [Editorial](#)

Available online 9th March 2020

Received: 28 July 2019; Accepted: 05 February 2020

<https://doi.org/10.1016/j.cosust.2020.02.001>

1877-3435/© 2020 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Do the main inventions in current environmental sustainability practices always come from the metropolitan laboratories or research centers? Could they also be of ‘non-Western’

origin? In order to answer this question, we aim to observe the literature on waste and waste management to identify particular biases, which we offer to analyze and challenge through a short presentation of two case studies from indigenous communities in the Russian North. The recently published literature on waste has mostly developed into two main research streams, which we will indicate in our review, while also signaling influential scholarship. These main streams encompass, on the one hand, a developmental approach to waste management and its sustainability and, on the other hand, a critical and relational approach to waste. The contributors of the waste management literature tend to take for granted that waste/trash/garbage is a natural category, ‘something to dispose of’, and consequently focus on problem-solving propositions. On the contrary, the social scientific waste studies, also referred to as discard studies and critical waste studies/waste theory, which originates in the 1966 seminal work by Mary Douglas, *Purity and Danger: An Analysis of Concepts of Pollution and Taboo*, do not accept waste as a universally accepted category, a common sense [1]. Rather, they propose a social, relational, and more critical stance towards it. In her review, Sarah Moore [2] offers a similar organization on the literature on waste, as she proposes a two-ax schema (positivity-negativity and dualist-relational). In her analysis, the first axis (positivity-negativity) construes waste as ‘imbued with meaning that may or may not be pre-given’, and the second axis (dualist-relational) defines “the degree to which waste is defined as something that is separate from society”. The epistemic cross that Moore proposes in her article aims to overcome dualisms in waste studies; however, it still leads to a rather dualistically structured model. We have opted for a simpler and more open-ended presentation of the literature on waste, given that in certain instances the axes overlap. While drawing from case studies from indigenous groups in the Russian North, we aim to bring those two main research streams into dialogue. In particular, we would like to bring to attention non-hegemonic practices amongst the communities of Veps (Siragusa) and Nenets (Arzyutov). These practices have often been neglected in the literature on waste and waste management. We would like to reveal some of the hidden biases comprised in the waste management literature, which due to its focus on innovation, implicitly devalorizes the ‘traditional’, with its basis on improvisation and seemingly less structured practices. As a sub-objective, we hope not only to incite a new dialogue on waste (management practices) by including Russia, but also to problematize the dominant perception that people and policies in this country are disengaged with environmental issues and concerns. We combine our ethnographies—based on long-term ethnographic fieldwork among Veps and Nenets

since 2009—with the analysis of the vast literature on waste and waste management. This approach shapes the structure of our article, which is organized in three sections on waste management, social studies of waste, and two (sub-)Arctic case studies taken from a historical and anthropological perspective.

Waste management and its sustainability

Within this research stream, waste is often taken for granted, as a broad category, which encompasses materials we no longer need. It has also come to symbolize a global ecological and social *problem*, given its unprecedented growth worldwide. Colonization [3,4], industrialization [5^{*}], and urbanization [e.g., 6,7] are often accounted for its disproportionate accumulation. This is particularly the case in large cities [8–12], where many end up feeling disconnected from the production of objects and materials to their disposal [15]. The alleged 'waste generation' is seen to be living in an era of 'surplus' and 'excess', and to have developed 'quick to use and quick to discard consumer habits' [14–16]. Given its new scale, many scholars within this research stream have advocated for the need to intervene and find a solution.

Even though waste management has always existed [5^{*},13,14,17,18], it has gained a new (political) significance 'in an era of environmental and economic crises' [19^{**}]. Recent studies seem to suggest that at present waste management needs to be addressed principally in poorer countries, given that since the 1970s the 'developed' world has promoted techniques and policies to tackle it [14]. Not only the so-called 'West' has advanced innovative measures, but has also attached them to a higher morality, given that these practices are often associated to green ideas and care for the environment [20–22].¹ This is the case of Norway [14], Sweden [23], and the U.K. [24,25]. So-called 'developed' countries are often described at the forefront in the implementation of policies, too [26]. With the clear objective to become a recycling society [27], for example, the European Union has been quite aggressively promoting 'eco-innovation' and 'circular economy' [28^{*},29–32]. Such an approach to waste management reveals hidden biases, as the so-called 'West' continues to epitomize the beam of innovation and progress, while other practices are civilly overlooked.

Poorer countries continue to be depicted as 'in need' of intervention, given their lower levels of engagement with waste management. The causes for this are often attributed to gender [20,33], education and income [11], health disparity [34], location [3,35–37], race [38,39], the lack of state intervention in certain areas [40], a combination of all of those [41], and is often rooted in a history of colonization [42].

¹ Littler [83]; however, indicates that many opt for a greater sense of responsibility towards the environment out of a sense of guilt.

Colonial disparity in the literature on waste management is assessed in many studies. For example, the lack of a state system to take care of waste is found in the literature about indigenous groups in North America [26,43]. However, many scholars also focus on long-term practices and knowledge, which they suggest to take more into account in decision-making processes [44–47]. Even though indigenous groups might still be depicted as 'noble indigenous ecologists' [48], who have been rather good at waste management [49,50], due not only to their ecological [51,52], but also symbolic, metaphorical, and economic knowledge [cf. 46], their 'traditional' practices are often belittled in decision-making procedures and public debates. For example, according to Solomon *et al.* [53], the old use of ash and recycled material to make the soil fertile among indigenous groups in Liberia and Ghana, West Africa, has been ignored [cf. 54]. Similarly, burning practices to dispose of waste has long lasted among indigenous communities in Saskatchewan [43], and in Labrador and Newfoundland [4]. Admittedly, the recent increase in plastic has made this practice more dangerous [26]. Overall, there is very little involvement and cultural recognition of indigenous groups practical knowledge in waste management in the U.S. and Canada [55]. Rather, those groups are advised to follow 'best practices' of waste management developed elsewhere and that are provided, for example, in such documents as the 'Solid Waste Management for Northern and Remote Communities: Planning and Technical Guidance Document'. In line with what bluntly stated by Goodman [56], we aim to acknowledge and raise awareness of longstanding indigenous practices, instead of discarding them.

Despite its benefits, the attention towards waste management often goes hand in hand with a specific ideological paradigm of progress that undermines a more discreet practical knowledge, which has long existed, but is not promoted as loudly and widely. We claim that the current state-of-the-art on waste management and its sustainability reinforces a power imbalance by portraying alleged 'western', 'developed' countries as cutting edge, caring, morally superior, whereas their innovative suggestions and attitudes of care often reproduce similar long-term practices among indigenous groups [on care and respect, see 57]. This paper argues for a recognition of practices, which have long endured and continue to be exercised among groups, which often have limited access to decision-making mechanisms—such as many indigenous groups—and, thus, its scope has also a decolonizing breath [cf. 58,59].

Social studies of waste

Within social studies of waste, the notion of waste is not taken for granted, as part of a 'colonial' monologue, which ignores its numerous and varied definitions within indigenous (but not only) communities [58]. Rather, the

accepted idea that waste is the ‘material we fail to use’ [60], ‘stuff that no longer has a place’ [5*], ‘a redundant product’ [15], and ‘materials that [. . .] are economically unusable’ [16] is under serious scrutiny as this kind of definition is often representative of a dominant ‘Western’ notion. Since Mary Douglas’ 1966 groundbreaking work, many scholars have questioned such an account of waste by problematizing both its heterogeneous and relational conceptualizations and social life cycle [1]. Even though there is no unified field of waste studies—still a rather recent discipline—the scholars within this research stream are interested in the cultural understanding and practices in and through which ‘waste’ is enacted and defined. Instead of conceptualizing waste as materials that over time have become obsolete and are consequently removed from people’s lives, the waste studies scholars not only ask themselves, ‘what is waste?’, but also ‘whose waste?’.

Waste is constructed symbolically [1]. Indeed, as part of a meshwork of relations, waste is often supplied with a value and attributed a symbol, which evolve over time and space [19**,61,62]. Reno [63**] refers to this “interpretative and semiotic process” as “common sense waste” within specific communities. Given this, it cannot be classified as a universal category. Waste is constructed politically [64]. Monsaingeon [64] notes that discarded objects, such as those which get lost in the ocean and are transported by currents, can make their way back into our lives, as fragments of the unconscious of time. They appear as material ghosts of modernity. Waste is constructed through socio-technical practices [e.g., 13,65]. As indicated by Higgin [5*] and Reno [13], ‘waste’, ‘garbage’, ‘trash’—all mass nouns—can become anonymous through an often invisible structure of collection, storage, sorting, burying and incineration, and thus let the multiple stories of its individual components evanesce. To a certain extent, the use of such mass terms alienates from local nuances and practices and reinforces inequality through processes of inconspicuousness and invisibility. In their analysis of transboundary trade of waste, Moore *et al.* [65] warn us of the development of local waste havens, which may “compound vulnerability and risk for specific communities”. More than having a universal category of waste, which can be applied everywhere, waste studies scholars take into account multiple, localized and situated conceptualizations of waste and consequent practices of waste management.

With this rationale in mind, some academics have turned to the study of indigenous notions of waste and waste management practices in the attempt to subvert power inequalities and continue to promote diversity. As noted by Hawkins [66], a whole lot of different ‘moral economies’ should be considered when addressing traditional logics of scarcity and frugality. Interestingly, the very notion of ‘moral economy’ has entered academic debates

through the work of Aleksander Chayanov on Russian peasant everyday economy. If, according to Nigel Clark [67], in the so-called ‘West’, waste is based on attempts to forget (by getting rid of it), indigenous ontologies are about remembering and sustaining, which means either making use of the surplus or leaving it to others. Bell [68] further challenges this dual perception of waste, which depicts it as either ‘in’ or ‘out’ of our lives. Rather, she claims that waste, as new material, is a ‘living’ object [68].² In particular, when addressing indigenous communities, she explains, “the very notion of ‘waste’ is problematic since it is premised upon a human/non-human, person/place divide that is rooted in Western modernism and Enlightenment rationality” [68:117]. She concludes, “only by rooting concepts and theories of waste within these radically different contexts can we gain a deeper understanding of the relationship between humans and the waste they generate, repurpose and reimagine” [68:117]. Among indigenous Nenets in the Russian Arctic, for example, whatever can be creatively integrated in material life cycles is not counted as ‘waste’ [Fieldnotes, Arzyutov, 2018]. Nenets use the word *xampo^pq*, which is semantically linked to the verbs ‘to shake, stir, and turn’. This term is closer to the meaning of *dust* than to that of *waste*. Given the plurality of ‘indigenous waste relationships’, we invite further studies on how those multiple connections and exchanges emerge, develop, manifest, as well as how they are lived as embodied practices [cf. 66:4].

While Hawkins [66] can be criticized for predominantly embracing a global North—meaning dominant, so-called ‘Western’—perspective, Bell [68] can be similarly summoned for neglecting the plurality of practices and voices that characterize the North, as she focuses on the Global South. In this paper, we indeed would like to surpass such a uniform perception about the North, given the multiethnic component of this vast territory from Alaska through Canada, Greenland, Iceland, Fennoscandia, to Russia. We thus introduce conceptualizations of waste and consequent waste management practices among indigenous people in the Russian North. Not only Russia appears peripheral in such ecological debates, but there also exists an often shared perception that the whole population of this country does not engage in sustainable practices of waste management. Lessons that can be learnt from such an analysis give ways to new perspectives of waste management as a highly important and rapidly growing field of modern economy.

² Waste as a ‘living’ object has the potential to be alive with stories about the people who disposed of it, also among so-called ‘Western’ dwellers [5*]. Discarded objects also appear to have agency when they come back into our lives, such as those transported by oceans and waters [64].

Waste (management) in the Soviet Union and Russian Federation

The Soviet Union and Russian Federation are scarcely represented in debates concerning waste management and its sustainability, in particular in the literature written in English [8,15]. For this, Boltakova *et al.* [69] blame the use of the Russian language rather than English in many of the researches conducted in/about Russia. Yet, in our search, we have not found much literature in the Russian language either. Those papers published in English often demand an intervention from the state [70–72], which lacks an integrated concept of waste management and seems to focus on the producer's responsibility, rather than its own [73]. Thus, they concur with the criticism towards the state action frequently made about poorer countries and indigenous groups. We problematize the situation in Russia, by integrating an indigenous perspective on waste and waste management [cf. 74]. We also add knowledge on the conduct of the Russian state by bringing to the fore more subtle interventions, which respond to a different socio-economic ecology and emerge from a recurrent condition of 'scarcity', rather than 'surplus'.

The creative appropriation of old materials and objects among Veps

Veps are an indigenous group, traditionally living in rural areas in Northwest Russia and at present counting 5936 individuals. Like many others rural and often indigenous dwellers in Russia and elsewhere [see, 16], Vepsian villagers have long engaged in creative and sustainable practices of re-use. Recurrent periods of 'scarcity' (or 'deficit', as depicted in late-Soviet Russia [74]), and local practical knowledge of respect and trust towards the environment [57] have pushed Veps, among others in Russia, to engage in sustainable practices or reduce and re-use. Such a behavior was supported by the Soviet state that, besides inserting columns on how to assemble tools using old materials in such magazines as *Yunyy tekhnik* (A Young Technician) [since 1956] and *Modelist-konstruktor* [since 1962], also approved the DIY identity that many citizens manifested to have [75]. It does not surprise, therefore, that throughout the 1970s, an interest on sustainable practices developed among a team of designers from Leningrad [76]. Such a support did not end with the collapse of the Soviet Union, as a show called *Ochen' umelye/OchUmelye ruchki* (Very skillful/crazy hands) began to be broadcasted on the national TV in 1992. On the one hand, the state regulates its continuous condition of crisis by handing over the responsibility for the environment and economy to its citizens. On the other hand, it fulfills a demand from the public, given long-term existing practices of re-use that extend the life to old objects and materials, and thus matches bottom-up initiatives.

Certain materials and objects, which have lost their initial purpose, do not fall into the category of waste (*murdod* and *rujod* in Vepsian); rather, they are creatively given a new life

Figure 1



Garden decorations made out of tires in Pondal, a central Vepsian village (Siragusa, 2015).

and symbolism. For example, car tires are used to decorate the gardens, oil barrels to collect the rain to irrigate the soil, and plastic bottles as vases (Figure 1). Such a practical knowledge is often founded on both care and respect for the environment and things, and a way to deal with extended periods of 'scarcity', according to which nothing goes to waste, but rather it is creatively re-used and lived with. Textile leftovers are often used to make carpets, pillows, cloths, and dolls.³ These practices are common elsewhere, as textile leftovers are often re-used. Among Veps, through a process of appropriation, they have gained also a new symbolism. These dolls have the unique trait of not being painted on the face; what's more, the remaining cotton threads that are collected while making the dolls are burned in a stove, in order to realize one's wishes [Fieldnotes, Siragusa, 2015] (Figure 2). The skill of making dolls, counted as Vepsian dolls, is also passed on to the children through master classes at school.

In line with global concerns of sustainability, the fashion industry is currently investigating the circularity of textile [77].⁴ While such initiatives respond to an economic and environmental crisis of global scale, they also concur with the idea that such waste management practices as 'circular economy' are cutting-edge and emerge from the 'developed' countries. This way, long-term practices of reduction and re-use among indigenous groups, such as

³ The re-use of textile is a practice, which has long been part of household management. As indicated by Strasser [18], at a time of mass industrialization, women used to re-use textile for quilts, rugs, covering tables and chairs.

⁴ 'Circular design' was first mentioned in McDonough and Braungart's *The Hannover Principles* in 1992.

Figure 2



Current Opinion in Environmental Sustainability

A master-class on how to make Vepsian dolls at the school in Kuya (Siragusa, 2013).

Figure 3



Current Opinion in Environmental Sustainability

Collecting driftwood and plastic waste along the coastline. Kolguev Island. 2010. Courtesy of Ivan Varnitsyn (Kolguev Island).

Veps, and the symbolism they have gained over time continue to be put into shade.

Waste on the sea shores: creatively engaging with 'scarcity' among Nenets

Given its distant location and extreme climate, the Russian Arctic has always been an area that is hard to get to, and this has challenged the authorities on how to solve the 'scarcity' of produce and reinforce their colonial influence there. Yet, local indigenous people have developed creative ways and knowledge on how to deal with the recurrent 'scarcity' of goods.

Such is the case of indigenous nomadic and semi-nomadic Nenets in the high Russian Arctic, which count more than 44 000 individuals. For example, one way to counterbalance the lack of firewood has been the use of driftwood, collected by Nenets families along the seashores [78]. Access to driftwood is regulated by kinship-based rules and family/clan land ownership. The act of collecting driftwood is deeply intertwined with gift-giving relations that sustain nomadic economies. Historically speaking, driftwood as a building material has significantly affected the everyday life of Nenets, as it served the purpose to construct sledges and tents, among other structures. The collection of driftwood—a natural waste of the Arctic Ocean—has recently been accompanied by the collection of plastic (e.g., containers, nets, and ropes), which is equally washed up onto the seashore (Figure 3) [cf. 64].

The plastic contamination of the ocean [79] has concurred with a great technological change among indigenous people in the Arctic, that is, the introduction of the snowmobile, often referred to as 'snowmobile revolution'. For many, this

meant searching for and/or creating containers where to store the petrol. In the context of late Soviet 'deficit' crisis, the Arctic seashores became 'free shops' where to find old re-usable tools for the petrol. Many Nenets on the Kolguev Island acknowledge going to a seashore 'as if going shopping' [Fieldnotes, Arzyutov. 2018]. Here Nenets appropriate and subvert a symbol of colonial disparity from continental Russia, the 'shops'. Collecting plastic waste follows the logics of collecting driftwood. Arzyutov's interlocutors on the Kolguev island explained that they have to take into account the 'ownership' of particular parts of the coastline. Nenets skilfully transform the materials, which reach these northern shores, while maintaining well-established economic and social practices of re-use and exchange. Such practices of re-use remind us of the famous notion of Bird-David [57], 'giving environment', with the difference that instead of organic produce, Nenets gather anthropogenic objects (Figure 4).

We are far from saying that colonial and power inequality should not be addressed by national and international political bodies, since indigenous groups find ways not only to live, but also to create something new with it. Just like demonstrated by Millar [80], where Brazilian scavengers are being identified with waste [see also, 2,81,82], the practice of collecting plastic among Nenets may equally put them in a lower social position in spite of the acknowledged success of their economic activities, as is the case for reindeer herding, hunting and fishing. Our aim is to put in the spotlight practices of re-use among indigenous groups in North Russia to show how much they continue to be discredited as inferior and spurred out-of-need and not as creative and noble endeavours. We consider this micro-level

Figure 4



Current Opinion in Environmental Sustainability

A bundle of plastic cans found on the seashore near Bugrino village on Kolguev island. (Arzyutov, 2018).

analysis paramount in understanding how sustainable practices work on the ground. Bringing our case studies into dialogue with the rapidly growing body of literature on waste and waste management, we hope to see more recognition and acknowledgment of indigenous and local (often rural) practices in both scholarship and politics.

Conclusion

In this paper, thanks to our anthropological approach, we have been able to identify hidden biases in presupposed 'innovative' waste management practices, which continue to reinforce social disparity and neglect different ways to conceptualize waste and engage in its management. We thus suggest exploring in more depth the work conducted by anthropologists, whose theoretical and methodological approaches can contribute to ecological concerns of such global scale. For this, we see value in inter-disciplinary research in debates about waste, waste management and sustainability. We also see a gap in the literature as well as in the policies, where the northern indigenous perspectives and practical knowledge concerning waste management and its sustainability are put aside, instead of being fully acknowledged for their social and cultural value. Thus, we propose such a direction in future research. We also suggest incorporating the multiethnic component of the Russian Federation in environmental debates, rather than continue to focus on the policies and the practices of the dominant Russian urban population and state.

Conflict of interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Acknowledgements

We are extremely grateful to our field collaborators for their time, sharing their knowledge and practices, which opened this new field of research for both of us. We would also like to express our infinite gratitude to the two anonymous reviewers for their precious comments, which hugely helped us improve our review.

The work done by Siragusa was supported by the Humanities Program at the Faculty of Arts, University of Helsinki, and by KONE Säätiö, *NORMAL* [grant number 201805889, 2018]. Fieldwork was also supported by the ERC Advanced Grant, Arctic Domus [grant number 295458, 2011].

The work done by Arzyutov was supported by the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement No. [716211 - GRETPOL]) and by the Russian Scientific Foundation, *The Energy of the Arctic and Siberia: The Use of Resources in the Context of Socio-Economic and Ecological Change* [18-18-00309, 2018].

References and recommended reading

Papers of particular interest, published within the period of review, have been highlighted as:

- of special interest
- of outstanding interest

1. Douglas M: *Purity and Danger: An Analysis of the Concepts of Pollution and Taboo*. Ark Paperbacks; 1966.
2. Moore SA: **Garbage matters: concepts in new geographies of waste**. *Prog Hum Geogr* 2012, **36**:780-799 <http://dx.doi.org/10.1177/0309132512437077>.
3. Hird MJ, Zahara A: **The arctic wastes**. In *Anthropocene Feminism*. Edited by Grusin RA. University of Minnesota Press; 2017:121-146.
4. Keske C, Mills M, Tanguay L, Dicker J: **Waste management in Labrador and northern communities: opportunities and challenges**. *North Rev* 2018, **47** <http://dx.doi.org/10.22584/nr47.2018.005>.
5. Higgin M: **The other side of society. Reflections on waste and its place**. *Antropologia* 2016, **3**:69-88 <http://dx.doi.org/10.14672/ada2016436%25p>
- Higgin invites anthropologists to think of waste relationally. He suggests going beyond its 'placement/displacement within human ways of life' and, rather, as a part of a more-than-human ecology in order to better comprehend the society we are continuously constructing and live in.
6. Liikanen M, Havukainen J, Viana E, Horttanainen M: **Steps towards more environmentally sustainable municipal solid waste management – a life cycle assessment study of São Paulo, Brazil**. *J Clean Prod* 2018, **196**:150-162 <http://dx.doi.org/10.1016/j.jclepro.2018.06.005>.
7. Chien Bong CP, Ho WS, Hashim H, Lim JS, Ho CS, Peng Tan WS, Lee CT: **Review on the renewable energy and solid waste management policies towards biogas development in Malaysia**. *Renew Sustain Energy Rev* 2017, **70**:988-998 <http://dx.doi.org/10.1016/j.rser.2016.12.004>.
8. Goulart Coelho LM, Lange LC: **Applying life cycle assessment to support environmentally sustainable waste management strategies in Brazil**. *Resour Conserv Recycl* 2018, **128**:438-450 <http://dx.doi.org/10.1016/j.resconrec.2016.09.026>.
9. He H, Reynolds CJ, Zhou Z, Wang Y, Boland J: **Changes of waste generation in Australia: insights from structural decomposition analysis**. *Waste Manag* 2019, **83**:142-150 <http://dx.doi.org/10.1016/j.wasman.2018.11.004>.
10. Havukainen J, Zhan M, Dong J, Liikanen M, Deviatkin I, Li X, Horttanainen M: **Environmental impact assessment of municipal solid waste management incorporating mechanical treatment of waste and incineration in Hangzhou, China**. *J Clean Prod* 2017, **141**:453-461 <http://dx.doi.org/10.1016/j.jclepro.2016.09.146>.
11. De Moraes Lima P, Olivo F, Paulo PL, Schalch V, Cimpan C: **Life Cycle Assessment of prospective MSW management based**

- on integrated management planning in Campo Grande, Brazil. *Waste Manag* 2019, **90**:59-71 <http://dx.doi.org/10.1016/j.wasman.2019.04.035>.
12. Moore SA: **The politics of garbage in Oaxaca, Mexico.** *Soc Nat Resour* 2008, **21**:597-610 <http://dx.doi.org/10.1080/08941920701759551>.
 13. Reno JO: **Toward a new theory of waste: from 'matter out of place' to signs of life.** *Waste Cult Soc* 2014, **31**:3-27 <http://dx.doi.org/10.1177/0263276413500999>.
 14. Jørgensen FA: **Green citizenship at the recycling junction: consumers and infrastructures for the recycling of packaging in twentieth-century Norway.** *Contemp Eur Hist* 2013, **22**:499-516 <http://dx.doi.org/10.1017/S0960777313000258>.
 15. Bakas I, Laurent A, Clavreul J, Saraiva AB, Niero M, Gentil E, Hauschild MZ: **LCA of solid waste management systems.** In *Life Cycle Assessment: Theory and Practice*. Edited by Hauschild MZ, Rosenbaum RK, Olsen SI. Springer International Publishing; 2018:887-926 http://dx.doi.org/10.1007/978-3-319-56475-3_35.
 16. Ajibade LT: **Indigenous knowledge system of waste management in Nigeria.** *Indian J Tradit Know* 2007, **6**:642-647.
 17. Bulkeley H, Gregson N: **Crossing the threshold: municipal waste policy and household waste generation.** *Environ Plan A* 2009, **41**:929-945 <http://dx.doi.org/10.1068/a40261>.
 18. Strasser S: *Waste and Want: A Social History of Trash*. An Owl Book & Henry Holt and Company; 1999.
 19. Isenhour C, Reno J: **On materiality and meaning: ethnographic engagements with reuse, repair & care.** *Worldw Waste J Interdiscip Stud* 2019, **2**:1 <http://dx.doi.org/10.5334/wwwj.27>
Although admitting that practices of re-use and recycle have long existed, Isenhour and Reno point out that these have recently been attached a broader political value, given the current economic and environmental crises. Thus, they approach such practices contextually and relationally to further explore their current significance.
 20. Braun YA, Traore AS: **Plastic bags, pollution, and identity: women and the gendering of globalization and environmental responsibility in mali.** *GenD Soc* 2015, **29**:863-887 <http://dx.doi.org/10.1177/0891243215602101>.
 21. Burgess J, Harrison CM, Filius P: **Environmental communication and the cultural politics of environmental citizenship.** *Environ Plan A* 1998, **30**:1445-1460 <http://dx.doi.org/10.1068/a301445>.
 22. Burnley SJ: **A review of municipal solid waste composition in the United Kingdom.** *Waste Manag* 2007, **27**:1274-1285 <http://dx.doi.org/10.1016/j.wasman.2006.06.018>.
 23. Bohlin A: **'It will keep circulating': loving and letting go of things in Swedish second-hand markets.** *Worldw Waste J Interdiscip Stud* 2019, **2**:3 <http://dx.doi.org/10.5334/wwwj.17>.
 24. Gregson N, Metcalfe A, Crewe L: **Identity, mobility, and the throwaway society.** *Environ Plan D* 2007, **25**:682-700 <http://dx.doi.org/10.1068/d418t>.
 25. Herrmann GM: **Reminiscence and recompense: reuse and the garage sale.** *Worldw Waste J Interdiscip Stud* 2019, **2**:4 <http://dx.doi.org/10.5334/wwwj.12>.
 26. Oyegunle A, Thompson S: **Wasting indigenous communities: a case study with garden hill and Wasagamack First Nations in Northern Manitoba, Canada.** *J Solid Waste Technol Manag* 2018, **44**:232-247 <http://dx.doi.org/10.5276/JSWTM.2018.232>.
 27. Onyanta A: **Cities, municipal solid waste management, and climate change: perspectives from the South.** *Geogr Compass* 2016, **10**:499-513 <http://dx.doi.org/10.1111/gec3.12299>.
 28. Kirchherr J, Reike D, Hekkert M: **Conceptualizing the circular economy: an analysis of 114 definitions.** *Resour Conserv Recycl* 2017, **127**:221-232 <http://dx.doi.org/10.1016/j.resconrec.2017.09.005>
This paper provides a review on the concept of 'circular economy', given its frequent and varied use in the most recent literature. The authors hope to thus spur a discussion, which might lead to a more coherent use of the term. Economic prosperity followed by environmental quality are attached to the concept of 'circular economy', often identified with practices of reduce, re-use, and recycle.
 29. Gente V, Pattanaro G: **The place of eco-innovation in the current sustainability debate.** *Waste Manag* 2019, **88**:96-101 <http://dx.doi.org/10.1016/j.wasman.2019.03.026>.
 30. Rizos V, Tuokko K, Behrens A: *The Circular Economy: A Review of Definitions, Processes and Impacts*. CEPS; 2017 <https://www.ceps.eu/ceps-publications/circular-economy-review-definitions-processes-and-impacts/>.
 31. Smol M, Kulczycka J, Avdiushchenko A: **Circular economy indicators in relation to eco-innovation in European regions.** *Clean Technol Environ Policy* 2017, **19**:669-678 <http://dx.doi.org/10.1007/s10098-016-1323-8>.
 32. Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives <http://data.europa.eu/eli/dir/2008/98/oj>.
 33. Ma J, Hipel KW: **Exploring social dimensions of municipal solid waste management around the globe – a systematic literature review.** *Waste Manag* 2016, **56**:3-12 <http://dx.doi.org/10.1016/j.wasman.2016.06.041>.
 34. Clifford HD, Pearson G, Franklin P, Walker R, Zosky GR: **Environmental health challenges in remote Aboriginal Australian communities: clean air, clean water and safe housing.** *Aust Indig Health Bull* 2015, **15**:1-13.
 35. Kubanza NS, Das DK, Simatele D: **Some happy, others sad: exploring environmental justice in solid waste management in Kinshasa, The Democratic Republic of Congo.** *Local Environ* 2017, **22**:595-620 <http://dx.doi.org/10.1080/13549839.2016.1242120>.
 36. Vázquez Maguirre M, Portales L, Velásquez Bellido I: **Indigenous social enterprises as drivers of sustainable development: insights from Mexico and Peru.** *Crit Sociol* 2018, **44**:323-340 <http://dx.doi.org/10.1177/0896920516688757>.
 37. Zeng C, Niu D, Zhao Y: **A comprehensive overview of rural solid waste management in China.** *Front Environ Sci Eng* 2015, **9**:949-961 <http://dx.doi.org/10.1007/s11783-015-0816-8>.
 38. Waldron I: **Re-thinking waste: mapping racial geographies of violence on the colonial landscape.** *Environ Sociol* 2018, **4**:36-53 <http://dx.doi.org/10.1080/23251042.2018.1429178>.
 39. Faber DF, McCarthy D: **Neo-liberalism, globalization and the struggle for ecological democracy: linking sustainability and environmental justice.** In *Just Sustainabilities: Development in An Unequal World*. Edited by Agyeman J, Bullard RD, Evans B. MIT Press; 2003:38-63.
 40. Conke LS: **Barriers to waste recycling development: evidence from Brazil.** *Resour Conserv Recycl* 2018, **134**:129-135 <http://dx.doi.org/10.1016/j.resconrec.2018.03.007>.
 41. Mignolo W: *The Darker Side of Western Modernity: Global Futures, Decolonial Options*. Duke University Press; 2011.
 42. Pellow DN: *Garbage Wars: The Struggle for Environmental Justice in Chicago*. MIT Press; 2002.
 43. Bharadwaj L, Judd-Henrey I, Parenteau L, Tournier C, Watson D: **Solid waste incineration in a Saskatchewan First Nation community: a community-based environmental assessment of dioxins and furans.** *Pimatisiwin* 2008, **6**:161-180.
 44. Goven J, Langer ER (Lisa), Baker V, Ataria J, Leckie A: **A transdisciplinary approach to local waste management in New Zealand: addressing interrelated challenges through indigenous partnership.** *Futures* 2015, **73**:22-36 <http://dx.doi.org/10.1016/j.futures.2015.07.011>.
 45. Hohenthal J, Räsänen M, Minoia P: **Political ecology of asymmetric ecological knowledges: diverging views on the eucalyptus-water nexus in the Taita Hills, Kenya.** *J Polit Ecol* 2018, **25**:1-19 <http://dx.doi.org/10.2458/v25i1.22005>.
 46. Jackson S, Tan P-L, Mooney C, Hoverman S, White I: **Principles and guidelines for good practice in Indigenous engagement in water planning.** *J Hydrol* 2012, **474**:57-65 <http://dx.doi.org/10.1016/j.jhydrol.2011.12.015>.
 47. Fernández-Llamazares Á, García RA, Díaz-Reviriego I, Cabeza M, Pyhälä A, Reyes-García V: **An empirically tested overlap between indigenous and scientific knowledge of a changing**

- climate in Bolivian Amazonia. *Reg Environ Change* 2017, **17**:1673-1685 <http://dx.doi.org/10.1007/s10113-017-1125-5>.
48. Hawkins G, Muecke S (Eds): *Culture and Waste: The Creation and Destruction of Value*. Rowman & Littlefield; 2003.
 49. Edington J: *Indigenous Environmental Knowledge: Reappraisal*. Springer; 2017.
 50. Jeffery L: 'We are the true guardians of the environment': human-environment relations and debates about the future of the Chagos Archipelago. *J R Anthropol Inst* 2013, **19**:300-318 <http://dx.doi.org/10.1111/1467-9655.12034>.
 51. McCarthy C, Shinjo H, Hoshino B, Enkhjargal E: Assessing local indigenous knowledge and information sources on biodiversity, conservation and protected area management at Khuvsgol Lake National Park, Mongolia. *Land* 2018, **7**:117 <http://dx.doi.org/10.3390/land7040117>.
 52. Morgan TKKB: An indigenous perspective on water recycling. *Desalination* 2006, **187**:127-136 <http://dx.doi.org/10.1016/j.desal.2005.04.073>.
 53. Solomon D, Lehmann J, Fraser JA, Leach M, Amanor K, Frausin V, Kristiansen SM, Millimouno D, Fairhead J: Indigenous African soil enrichment as a climate-smart sustainable agriculture alternative. *Front Ecol Environ* 2016, **14**:71-76 <http://dx.doi.org/10.1002/fee.1226>.
 54. Salim MV da C, Miller RP, Ticona-Benavente CA, van Leeuwen J, Alfaia SS: Soil fertility management in indigenous home gardens of Central Amazonia, Brazil. *Agrofor Syst* 2018, **92**:463-472 <http://dx.doi.org/10.1007/s10457-017-0105-6>.
 55. Marshall RE, Levison JK, McBean EA, Brown E, Harper SL: Source water protection programs and Indigenous communities in Canada and the United States: a scoping review. *J Hydrol* 2018, **562**:358-370 <http://dx.doi.org/10.1016/j.jhydrol.2018.04.070>.
 56. Goodman N: When forever comes, we will be here. Cultural management and indigenous peoples of the Pikes Peak region. *Indig Policy J* 2018, **29** In: <http://articles.indigenouspolicy.org/index.php/ijp/article/view/549/538>.
 57. Bird-David N: The giving environment: another perspective on the economic system of gatherer-hunters. *Curr Anthropol* 1990, **31**:189-196.
 58. Bird Rose D: Decolonizing the discourse of environmental knowledge in settler society. In *Culture and Waste: The Creation and Destruction of Value*. Edited by Hawkins G, Muecke S. Rowman & Littlefield Publishers; 2003:53-72.
 59. Muecke S: Devastation. In *Culture and Waste*. Edited by Hawkins G, Muecke S. Rowman and Littlefield Publishers; 2003.
 60. Gille Z: Of fish feces, shamanic bowls and chimpanzee scraps: extension vs precision in the concept of waste. *Worldw Waste J Interdiscip Stud* 2018, **1**:2 <http://dx.doi.org/10.5334/wwwj.22>.
 61. Hetherington K: Secondhandedness: consumption, disposal, and absent presence. *Environ Plan D* 2004, **22**:157-173 <http://dx.doi.org/10.1068/d315t>.
 62. Martínez F: Waste is not the end. For an anthropology of care, maintenance and repair. *Soc Anthropol* 2017, **25**:346-350 <http://dx.doi.org/10.1111/1469-8676.12436>.
 63. Reno J: What is waste? *Worldw Waste J Interdiscip Stud* 2018, **1**:1 <http://dx.doi.org/10.5334/wwwj.9>
This paper elucidates the complexities of providing 'waste' with a clear definition in the recent literature. Reno invites the scholars in identifying which sense of waste they address in their work to avoid misunderstandings. He identifies three senses of waste, for example, 'ecological, utilitarian, and moral-political'. He adds that 'common senses of waste', instead, are 'ongoing semiotic or interpretative processes, which emerge from the very gaps between interpretations of waste and waste itself'.
 64. Monsaingeon B: De la présence aux restes. *Socio-Anthropologie* 2016, **34**:67-79 In: <https://journals.openedition.org/socio-anthropologie/2443#text>.
 65. Moore SA, Rosenfeld H, Nost E, Vincent K, Roth RE: Undermining methodological nationalism: cosmopolitan analysis and visualization of the North American hazardous waste trade. *Environ Plan A Econ Space* 2018, **50** <http://dx.doi.org/10.1177/0308518X18784023>.
 66. Hawkins G: *The Ethics of Waste: How we Relate to Rubbish*. Rowman & Littlefield Publishers; 2005.
 67. Clark N: Aboriginal cosmopolitanism. *Int J Urban Reg Res* 2008, **32**:737-744.
 68. Bell L: Place, people and processes in waste theory: a global South critique. *Cult Stud* 2019, **33**:98-121 <http://dx.doi.org/10.1080/09502386.2017.1420810>.
 69. Boltakova NV, Faseeva GR, Kabirov RR, Nafikov RM, Zakharov Yu A: Utilization of inorganic industrial wastes in producing construction ceramics. Review of Russian experience for the years 2000-2015. *Waste Manag* 2017, **60**:230-246 <http://dx.doi.org/10.1016/j.wasman.2016.11.008>.
 70. Kaazke J, Meneses M, Wilke B-M, Rotter VS: Environmental evaluation of waste treatment scenarios for the towns Khanty-Mansiysk and Surgut, Russia. *Waste Manag Res* 2013, **31**:315-326 <http://dx.doi.org/10.1177/0734242X12473792>.
 71. Starostina V, Damgaard A, Rechberger H, Christensen TH: Waste management in the Irkutsk Region, Siberia, Russia: environmental assessment of current practice focusing on landfilling. *Waste Manag Res* 2014, **32**:389-396 <http://dx.doi.org/10.1177/0734242X14526633>.
 72. Tulokhonova A, Ulanova O: Assessment of municipal solid waste management scenarios in Irkutsk (Russia) using a life cycle assessment-integrated waste management model. *Waste Manag Res* 2013, **31**:475-484 <http://dx.doi.org/10.1177/0734242X13476745>.
 73. Nevskaya MA, Marinina OA: Regulatory aspects of mining waste management in the Russian Federation. *Biosci Biotechnol Res Asia* 2015, **12**:2619-2628.
 74. Brednikova O, Tkach O: 'Griaznaia derevnia' i 'zamosorenniy gorod' (obyednyye praktiki obrashcheniia s musorom v raznykh soobshchestvakh). *Antropologicheskii forum* 2008, **8**:338-352.
 75. Golubev A, Smolyak O: Making selves through making things: soviet do-it-yourself culture and practices of late soviet subjectivation. *Cahiers du Monde russe* 2013, **54**:517-541.
 76. Karpova Y: Visions and visualization of sustainability: leningrad designers in search of soviet recycling system, 1981-1984. In *The Oxford Handbook of Communist Visual Cultures*. Edited by Skrodzka A, Xiaoning L, Marciniak K. Oxford University Press; 2020 <http://dx.doi.org/10.1093/oxfordhb/9780190885533.013.9>.
 77. Goldsworthy K, Earley R, Politowicz K: Circular speeds: a review of fast & slow sustainable design approaches for fashion & textile applications. *J Textile Des Res Pract* 2018, **6**:42-65 <http://dx.doi.org/10.1080/20511787.2018.1467197>.
 78. Alix C: A critical resource: wood use and technology in the North American Arctic. In *The Oxford Handbook of the Prehistoric Arctic*. Edited by Friesen TM, Mason OK. Oxford University Press; 2016:109-129 <http://dx.doi.org/10.1093/oxfordhb/9780199766956.013.12>.
 79. Villarrubia-Gómez P, Cornell SE, Fabres J: Marine plastic pollution as a planetary boundary threat – the drifting piece in the sustainability puzzle. *Mar Policy* 2018, **96**:213-220 <http://dx.doi.org/10.1016/j.marpol.2017.11.035>.
 80. Millar KM: *Reclaiming the Discarded: Life and Labor on Rio's Garbage Dump*. Duke University Press; 2018
Through the experiences of 'catadores' (scavengers), who sift through rubbish in Rio's Garbage Dump, Millar seeks to subvert the notion of scarcity as the dominant one in understanding 'lives lived in precarious conditions'. She conceptualizes the practice of collecting recyclables as a form of living to be understood both as a livelihood and a way of life.
 81. Bauman Z: *Wasted Lives: Modernity and its Outcasts*. Polity Press; 2003.
 82. Medina M: *The World's Scavengers: Salvaging for Sustainable Consumption and Production*. AltaMira Press; 2007.
 83. Littler J: What's wrong with ethical consumption? In *Ethical Consumption: An Introduction*. Edited by Lewis T, Potter E. Routledge; 2013.