Russia's waste policy and rural waste management in the Karelian Republic: building up a ruin to come?

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Russia's waste management system and legislative framework have undergone an ambitious revision process to fix Russia's pending waste crisis and push waste management towards the levels of its Western neighbours. While the reforms aim to tackle Russia's insufficient waste management, the local implementation realities of these central policy strategies, particularly in rural areas, are largely neglected. Rural communities throughout Russia are to implement a waste policy system which is not only unsuitable in its current form, but wherein local realities are in stark contrast to their representations in the realms of policy design. Obliged to implement nonetheless, these mismatches seem destined in building up a ruin to come of a waste management system that will be dysfunctional and locally contested, particularly in relation to its environmental impact. To scrutinise these developments, the paper is framed by a conceptualisation of policy mobility and translation, with an in-depth focus on localised assembling processes that implement Russian waste legislation in three local communities in the Karelian Republic. It analyses rural waste management in Russia through the Regional Waste Management Programme of the Karelian Republic and their processes of implementation. Based on qualitative analysis, the core focus is on local perceptions, waste management infrastructure and local spatial components that highlight the incompatibility between the current institutionalised planning documents and visions of waste policy in Russia and the geographical realities in the places of materialisation.

Keywords: waste management, rural municipalities, Russia, Karelian Republic, policy mobility

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Introduction

While the EU and its member states are on their, although variegated, way to implement an ambitious, reduction focused waste policy framed within a circular economy package (COM 2020), the situation in neighbouring Russia can be described as a ground zero. Currently only a handful of larger urban centres are equipped with modern waste facilities and a functional waste sorting and recycling system (UN 2018; Greenpeace 2020). Whereas the state controlled economy was often plagued by resource scarcity at the end of the Soviet period, it achieved recycling rates of up to 70% for materials like scrap metal and separate collection of glass and paper were wide spread (Alabaeva *et al*. 2019; Plastinina *et al*. 2019; Riki 2019). Yet, the last 30 years have eroded this reuse culture and the lack of waste management systems and policies have had and continue to have devastating impacts for the environment and public health in Russia. There have been improvements in the past years and grass roots recycling schemes have gained some popularity in Russian cities (Yarovaya 2018), but official statistics estimate a recycling rate of only 7% for Russia's municipal solid waste (MSW) (TASS 2019). Approximately 2% of MSW is utilised as an energy source in one of Russia's ten waste incineration plants. Consequently, most of the 60 M tonnes of annually collected MSW are transported and disposed of in one of Russia's over 15,000 officially registered landfills and management centres (polygons) or in one of its estimated 60,000 illegal landfills (TASS 2017; DRG 2018a). While landfills are widely considered an unsustainable practice with immense negative effects on the environment in Russia, these impacts are multiplied by the fact that most landfills are insufficiently equipped, filled beyond maximum capacity and lack most modern off-flow prevention measures such as methane recuperation or even basic protection against the leaching of harmful substances in the surrounding environment (IFC 2012; Greenpeace 2016; Ivantsova 2016).

The problem of insufficient waste management is not particularly Russian but appears in many developing economies (e.g. Mihai 2017), and is common among post-Soviet and Eastern European countries (e.g. Skryhan *et al*. 2018; Mihai & Grozavu 2019; Ladychenko *et al*. 2020). The situation in eastern EU member states is improving due to the EU's waste legislative framework and access to related funding instruments such as regional development funds (EPRS 2017; EEA 2019). On the contrary, and despite a general orientation towards EU legislative approaches, non-EU Eastern states struggle to implement functional legislation (Skryhan *et al*. 2018). Additionally, current developments to modernise waste management and introduce sorting systems are reserved mainly for larger cities and regional centres while the situation in rural areas remains critical. This rural-urban paradigm in waste management is particularly common in regions with low population density but has also been noted for EU members and other high-income countries such as Canada (Keske *et al*. 2018; Mihai & Grozavu 2019). In Russia, this gap is clearly visible in basic figures on access to waste services with deteriorating numbers for smaller settlements (Greenpeace 2020). Yet, with a bulk of literature accessing EU waste directive and management (e.g. Marin *et al*. 2017; Reggiani & Silvestri 2018), studies that evaluate waste management in Russia, and particularly the rural situation beyond the use of official statistics, are currently missing.

The waste situation in many Russian towns and villages, and their direct negative effects on the environment and health, have sparked a wave of protests throughout Russia, making waste management a key topic of today's societal debate (Digges 2019). The Russian government has realised the implication of its massive waste problem for the environment but also its significance in societal debate. Consequently, examples from Western neighbours have been adopted, and novel amendments to update its outdated waste legislation have been prepared. The new legislation entered into force in 2019 (FL 1998/2018[1]) and has led to a variety of progressively revised territorial waste management schemes in 77 Russian regions since 2017. Borrowing from EU waste policy approaches (Garkusha 2018), the Russian legislation is designed as a policy transfer system (e.g. Dolowitz & Marsh 2000), open to certain adjustments, and consequently resulting in a multiplicity of regional governance approaches that guide territorial waste management schemes (FL 1998/2018). Yet, the believe in functional policy transfer systems moving policy trajectories smoothly from A to B without a proper integration of the localized translations and mutation processes has been questioned (McCann & Ward 2012a).

While some of the solutions to implement the new waste management policy, such as Moscow's plans to transport waste to Archangelsk Region, have sparked mass protests (MT 2018), others entered into force with less public attention but with equally important problems in their local implementation. Aside from generally neglecting rural communities, the legislation's and regional approaches' reliance on weak (statistical) local waste background data increases the challenges for implementation. To understand these challenges and their alternatives, we need to examine the processes of policy mobility, implementation and the local spatial characteristics that affect them (Albrecht 2019). The policy mobility concept provides a conceptual and methodological approach to assess the travel and mutations of policies on their continuous journeys between nodes of design and implementation, and is a further well-suited analytical tool for this endeavor (McCann & Ward 2012a; Peck & Theodore 2015; Baker & McGuirk 2017). To evaluate this policy mismatch and assess the current situation of the legislative reform for rural areas, the paper follows the policy (cf. McCann & Ward 2012b), and analyses the situation in three villages obliged to implement the legislation under the territorial waste management scheme of the Karelian Republic in operation since 2018.

To assess the challenging policy materialization processes of waste reform in rural areas, the case studies allow the paper to answer the following research questions: 1) how are rural communities prepared to implement the new waste legislation; 2) how are rural communities integrated in the new legislation; and 3) what are the key challenges and potentials to implementing a functioning waste management system in rural Russia? These questions enable a detailed discussion of the (un-) suitability of the current legislation to provide geographically balanced delivery of its policy and provides some avenues with the potential to counter these mismatches. They also contribute to understanding the complex processes of policy mobility and the devastating effects of ill-informed or misguided policy translations.

The next section provides an introduction to the conceptualisation of Russian waste policy and rural implementation in a policy mobility framework, followed by a methodology section including a description of the case study sites. Then the paper introduces the current Russian waste policy reform, the Karelian Republic's regional translation of it and discusses the processes of policy implementation in the three villages. Finally, the discussion and conclusion wrap up the findings, provide conceptual implications and suggests avenues for future research and alternative solutions.

Rural places and waste policy mobility and translation

The Russian waste legislation, with its regional schemata, is designed as a system of policy transfer that transports policy aims through place-based adjustments from the nodes of design towards local implementation (e.g. Dolowitz & Marsh 2000). Regional adjustment takes place largely through the creation of regional programmes and territorial schemes while local entities predominantly play the role of practitioners. Yet, such deceivingly well-structured approaches and conceptualisations of policy transfer, as described in policy studies by Dolowitz and Marsh (2000), have been strongly criticised for their linear and positivist characteristics as well as for their negligence of locally embedded heterogeneous spatial processes, which affect and reproduce policy mobility, translation and implementation (Peck 2011; McCann & Ward 2012a). Instead, the policy processes argued for in policy mobility literature urges scholars to examine, among other things, the 'localisations' of policies that enable a shift of the policy's trajectories and outcomes, and that neglect to do so may result in policy failure (Peck & Theodore 2015; Albrecht & Rytteri 2017).

Geographers have predominantly employed the policy mobility concept to study the mobilities of urban development and planning related policies (McFarlane 2011a; Baker & Temenos 2015; Baker *et al*. 2016), yet it has proven valuable for other fields such as energy, health, and policy expertise/ knowledge in general (e.g. Temenos 2015; Wood 2016; Albrecht *et al*. 2017). While the general focus is on the mobility and accompanying translation processes of policies themselves with the dominant perspective on policy making circles (McCann 2013; Baker *et al*. 2016), for this paper the concept holds much to offer in its ability as a methodological–analytical framework (e.g. Baker & McGuirk 2017). It further highlights the role of rural translation and materialization processes as "learning machines" (see McFarlane 2011b, 360), to be employed by policy makers to design mobile and just policy. Its

relational ontology and conceptualization through assembling processes (Prince 2017) thereby provide key values that enable: first, to scrutinize the relational processes of policies when hitting the ground; second, to integrate the relational and multiple assembling of places themselves (Massey 2005; Woods 2016), hence the locations where policy is implemented; and third, to assess processes related to the mobility of knowledge and expertise employed to design policies (Wood 2016). These socio-spatially reproduced processes are key features to understand the heterogeneous realities of mobile policies contrary to their institutional design framed in and to be operationalised in places represented as assumptive, indicator based socio-economic containers (Albrecht 2019).

Thus, when studying the locally rooted translations of a policy, assemblage approach promotes a focus on multiplicity, emergence, relations of exteriority and power (Savage 2019). This has guided the empirical analysis and data collection for this paper towards a qualitative, in-depth evaluation of a policy's resting place to understand its implementation but also the effects of a relational place on the policy itself (Baker & McGuirk 2017). For the latter, the circulation of policy ideas or related expertise has been a core focus of policy mobility studies (see Wood 2016) with much attention being paid to the diffusion of "success stories" in expert circles (e.g. McCann 2013; Wood 2014; Baker at al. 2016). Policy mobility and translation is thus tied to flows of policy learning and expertise that intentionally or unintentionally affect policy design, translation, mutation and implementation. On the other side, evaluating the 'localisations' of policies allows us to grasp the assumptive narratives of policy making, its policy knowledge that frames policy rationalities (Peck & Theodore 2015), and compare them with the processes of heterogeneous assemblages at the places of policy implementation.

Policy mobility conceptualisation hereafter is less about learning from models and 'best practices' (e.g. McCann 2013; Temenos & McCann 2013) than an analytical tool to study the incompatibility of policy knowledge and expertise, in this case Russian federal and regional waste policy documentation and strategy, due to the negligence of local assembling processes in policy making. In this way the paper, similar to McFarlane's (2011b) view of the city as a machine for learning, promotes the role of rural communities as a currently marginalised yet paramount place for policy learning. While this paper does not fully unpack the assumed singularity of Russian waste policy in a wider sense, it scrutinises the resting places and their social-spatial assembling processes as important nodes of policy translation, mutation and failure (e.g. Clarke *et al*. 2015; Albrecht & Lukkarinen 2020). It thereby evaluates a critical aspect of wider waste related governance structures in Russia and provides insights into the potentials and challenges of the revised waste policy as well as matters of environmental justice for peripheral areas.

A case study of three Karelian villages

The empirical data is linked to three case studies in the Karelian Republic: Vedlozero, Naistenjärvi and Tolvuja (Fig. 1). The three villages differ in their peripheral locations, yet they all contain a population of roughly 1,000 inhabitants, have multiple small grocery shops and a school offering education from grades 1–11. They are located in three different districts and are subject to different translations and possibilities for implementation of the regional territorial scheme. While Naistenjärvi is a declining former industrial community, Tolvuja and Vedlozero developed largely as agriculture-based settlements in the Soviet kolkhoz system.

Based on the assemblage approach, the study uses a qualitative leaning mixed methods approach and follows policy in a rather exploratory fashion to its localisations (e.g. Peck & Theodore 2015). Hence, empirical data collection engages with local waste policy implementation and translation practices through a rather unstructured and self-unfolding series of observations, conversations and engagements in the case study localities, but also related to the regional waste policy sphere. The three villages are employed as exemplifying case studies rather than for comparison. The qualitative, in-depth case studies are framed by an assemblage approach incorporating multiplicity, processuality and the labours of assembling (Baker & McGuirk 2017). Following Baker and McGuirk (2017), these commitments have particular practical implications for data collection: *Multiplicity* encourages a focus on the heterogeneous contexts and agendas that reproduce localized assembling processes and require rich empirical data. *Processuality* demands focus on the mix of localized and exterior practices

Fig. 1. Location of case study villages.

and events including their temporal developments that have created current capacities. *Labours of assembling* requires a focus on the conscious and unconscious workings of entities to enroll in, change or maintain ongoing assembling processes. Data collection targeted these heterogeneous ongoing and open processes of waste management and policy implementation within the villages and their relations of exteriority (Woods 2016).

Empirical data was collected within the cross-border cooperation project WasteLess Karelias, which aims at improving waste management in rural Karelian villages in Finland and Russia. The study includes strong features of action research (e.g. Kindon *et al*. 2007) as researchers are directly involved with improving the current situation in collaboration with local authorities and residents as they collect data. This affects the positionalities of the researchers as actors directly involved in the subject of study (e.g. Rose 1997). It allowed us to collect empirical rich, heterogeneous and open empirical material required for the studies' aim to display the assembling of local processes and particularly the challenges of transforming rural waste management. Intensive case studies were conducted in the three municipalities. Empirical data was gathered during multiple site visits lasting from several hours to several days in all municipalities from 2017–2020. The key content of empirical data stems from personal encounters with local administrations and residents in the form of open-ended interviews and personal communications carried out in Russian language. This included individual and group interviews/discussions, informal communication with local residents on the street or in their yards and communication from joint planning meetings with local administrators (e.g. village heads) and schools (teachers & pupils). In the villages, eight formal interviews were conducted with officials, four at local schools and three with villagers between 2018–2020 in addition to the numerous informal encounters and observations. Additionally, data collection included a survey on waste perceptions

with 100 households per village and a shorter school survey of local pupils which generated 372 responses. The paper does not contain an in-depth analysis of the quantitative empirical materials but employs some key findings to support its qualitative analysis.

Data were also collected through interviews and personal communications with regional waste management officials and experts. Four interviews were conducted with directors and deputy directors of the Karelian Regional Operator Avtospetstrans, two interviews with experts from a regional recycling company, and one with a municipal sub-operator. Additional data are derived from a roundtable discussion organised in autumn 2019 in Petrozavodsk and a waste management study tour to Finland in 2020, which included Russian waste experts from regional authorities, Non-Governmental Organisation's (NGO), local administrations and companies. Finally, a document analysis focusing on legal and statistical sources contributed to data collection.

Karelian territorial schemes within the Russian waste reform

Major amendments to the Russian law "On Production and Consumption of Waste" (FL 1998/2018) was signed by President Putin in December 2017. The revised waste legislation is monitored by the newly established federal "Russian Environmental Operator" (REO) and brought major changes to the system of waste management in Russia. The amendment shifted responsibilities for waste management from the municipal to the regional institutional level with regions obliged to choose and contract a regional operator, adopt regional waste management programmes, and establish territorial waste management schemes to be carried out by regional waste management operators (FL 1998/2018). As of September 2019, 77 of 85 regional subjects of the Russian Federation have launched progressively revised territorial waste management schemes based on their translations of the generic federal targets (Kommersant 2019). Within the reform, the collection of waste management fees has been moved from management companies to the regional operators, and the calculative basis has shifted from living space to a per person flat rate. Furthermore, regional operators are charged with the task of developing separate garbage collection and eliminating unauthorised dumps and landfills. In addition to shifting these tasks to the regional level, the reform introduced a producer responsibility scheme, standards for waste recycling and requires technical standards to collect waste statistics, such as scales at landfills and vehicles to be equipped with the GLONASS system (e.g. FL 1998/2018; Plastinina *et al*. 2019). The last aspect is of key importance to the planning of future Russian waste management as current Russian waste statistics are unreliable and considered to be of poor quality (Plastinina *et al*. 2019).

From a wider policy perspective, the waste reform is embedded in the national project "Ecology", one of 13 vitally important projects under "The Future of Russia" framework aiming at wide transformations to increase welfare and the standard of life in Russia (Future Russia 2020). The waste section subproject "Integrated Management System for Solid Municipal Waste" in the Ecology framework is of key importance for the waste reform as it structures its financing and budget. The required 6-year budget for the subproject (2019–2024) is 4.3 B€ and follows ambitious aims to increase the recycling rate from 3% (2018) to 36% (2024). While this appears a voluminous budget at first sight, it is not a reserved and readily available sum but predominantly based on extrabudgetary funds (private investment), to be potentially acquired with 37% covered by equally potentially to be acquired federal funds, and 2% by regional funds (MNR 2020).

According to ministerial and REO officials, Russia is on track to reach its recycling and private investment aims (TASS 2019). Yet the crux of these figures goes beyond the fact that the statements are based on questionable waste statistics. The main problem lies with the financing of the federal funds envisioned through the Extended Producer Responsibility (EPR) scheme. The Russian EPR provides producers and importers with different solutions to fulfil their responsibility (Fig 2). Based on the low costs compared to the alternative options, most have chosen to pay the so-called environmental fee (option 3) instead of investing in their own systems (option 1), or contracting a licensed waste handling company or joining an association that establishes recycling systems (option 2). In addition, the environmental fee is paid only for a progressively rising percentage of the producers' product; for instance, 20% of polymers in 2020 and not for the whole production (DGR 2017). The multiple

employed recycling ratios for different products, the vaguely defined and largely unprofitable alternative options, and the low environmental fee have created a system that not only prevents company driven investments in recycling infrastructure but also diminishes the revenue for the federal funds intended to finance the recycling infrastructure by more than half (Ovsyannikova 2019). Additionally, the original intent of these funds in the law is for processing collected materials and not for local sorting infrastructures suffering from high investment debt, particularly in rural areas.

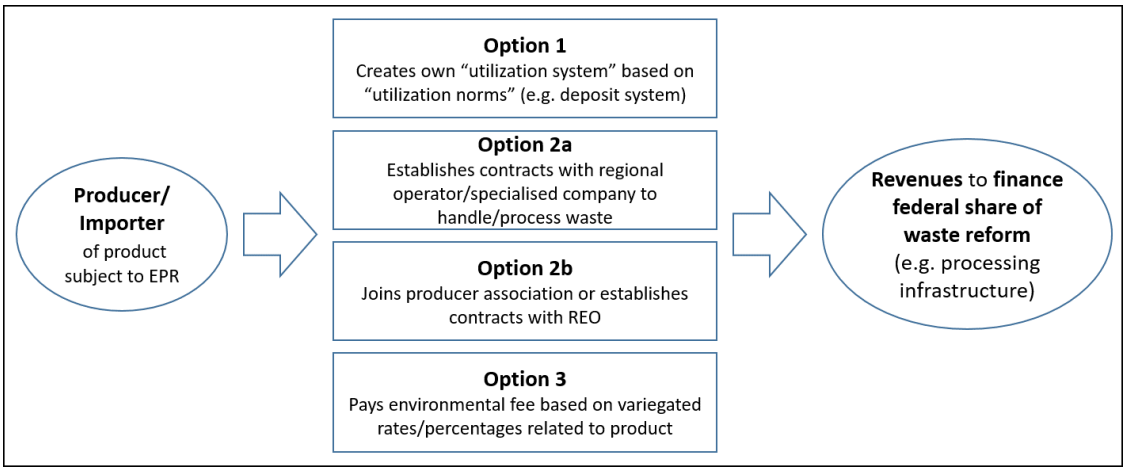

Fig. 2. Overview of Russian Extended Producer Responsibility (EPR) scheme.

Despite these flaws, the waste reform has created a new umbrella policy framework that aims to be geographically adjusted in different regions through regional schemes. Following federal legislation, the Karelian Republic's regional programme and territorial scheme of waste management of the Karelian Republic (TSKR) entered into force in 2018 (DRG 2018a). A state-owned enterprise, Avtospetstrans, was chosen as the regional operator and is responsible for the implementation of the reform in the Karelian Republic. Avtospetstrans is entrusted with key responsibilities to manage and implement the system, like arranging subcontractor agreements, building, restoring and remediating sorting stations and landfills, monitoring progress, and communicating with municipal stakeholders as well as reporting to the regional government (Agreement 2018). The reform in the Karelian Republic is based on the establishment of a central state-of-the-art waste complex near the Republic's capital of Petrozavodsk and waste transfer/sorting stations in each of the 14 municipal districts. It includes the closure of all landfills with negative environmental impacts (almost all current landfills), ill equipped local dumps/landfills as well as a stepwise increase of different sorted waste fractions. Contrary to other regional schemes, it rejects incineration as a solution and emphasises sorting and recycling. Initially, a regional government decree portrayed the TSKR pathway as commencing separate mixed waste and plastic collection from 2019, organic waste by 2020 and glass, paper and cardboard by 2021 (DRG 2018b). Nevertheless, the current version of the TSKR emphasises the initial separation of organic and other mixed wastes to move forward (TSKR 2019, 12). The problem for both TSKR related strategies is tied to the shaky financial foundation of the reform in general, which also restricts possibilities elsewhere in Russia. Hence, as pointed out by a representative of Avtospetstrans, "the federal budget helps in no way to develop a separate waste collection system…" (Interviewee 1), and that without a substantial private investment in such sorting systems it is unlikely that any of them will become widely distributed in the near future. Currently, sorting remains marginal even in the regional capital of Petrozavodsk with no stable publicly available system in place (Greenpeace 2020).

Aside from the problematic federal financing of waste sorting and processing facilities, activities in the TSKR are financed by the household-based collection fee of 85–94 RUB (1.1–1.2€) per person per month (RRC 2019). Currently, the only fully implemented part of the waste reform, the non-disclosed

sum of the fee collected are destined to finance costs related to the collection, transport and landfilling of mixed MSW as well as the administrative costs of the regional operator. Hence, it is envisioned as financing the costs of waste collection, transport and disposal systems while the collection and disposal infrastructure is currently insufficient or even non-existent in many municipalities, resulting in that residents pay the new fee with no change in their waste management. This challenge is directly linked to the responsibilities of the municipalities, which remains largely placing and maintaining local collection points (FL 1998/2018) with no structured financial support within the TSKR. Given the weak financial situation of most rural municipalities in the Karelian Republic and Russia in general, this amounts not only to challenges for the municipalities but for waste management in rural Russia in general.

Finally, the envisioned MSW system in the TSKR relies on a specifically developed regional database. While municipal administrations were asked to provide supplemental information on their own situation, it seems that, at least in our case study villages, this failed to create accurate data. Hence, regional authorities and subcontractors are confronted with a situation where the planning and financing of waste management is based on a fairy tale of existing rural waste infrastructure which quickly leads to the neglect of rural sites in general. On paper the revised waste legislation has created a well-structured policy system that aims to transfer the overall target of "improving the waste situation" (FL 1998/2018) throughout various administrative levels towards local implementation. Yet as indicated above, there are not only flaws in the policy design, but the current situation raises serious doubts about the suitability of this emerging system for implementation, particularly in rural settlements.

Waste policy hits the ground: processes of implementation in three Karelian villages

> It has been repeatedly said by various experts that the Federal Law No. 89 'On Production and Consumption of Waste' was based on European legislation and should in principle work. (Garkusha 2018, 8, translation by author).

This perspective by Russian waste policy experts clearly portrays the policy transfer rooted attitude towards the travel of policy objectives. A policy movement that is expected to deliver planned outcomes through geographical adjustments provided in territorial schemes. This, however, is largely wishful thinking, particularly when imposing a system that neglects local peculiarities or leaves little room to address those peculiarities, as becomes evident when examining the current situation in the three case study villages.

The waste management systems in the three villages differ substantially (Table 1). While none of the systems fulfil any standards whatsoever, the general aim is to get the waste out of the central village environment with limited success. Littering in all villages is a large problem and, according to the survey, 69% of households consider it a serious problem. Mapping of the litter situation in 2019 supported the residents' opinions and aside from the usual suspects, such as beer and vodka bottles or food and candy wrappers, the villages contain multiple dump sites entailing large amount of waste including a hazardous waste such as batteries, oils and medical waste. While there are several socio-economic reasons for this situation, such as abandoned housing, low education and income levels of many residents and high rates of alcohol abuse, the insufficient waste system is a major contributing factor to the problem.

The current collection infrastructure observed in the villages also differ. Vedlozero is the only village that has an open metal container system, some with homemade lids to prevent the spread of waste by birds and animals. In Naistenjärvi waste is collected in homemade wood framed waste pits and disintegrating containers. Tolvuja uses old wooden milk churn stands as collection points which means garbage bags are unprotected and their contents are quickly spread by animals and wind turning the collection points into badly littered places. Generally, the management systems and infrastructure observed in these places differ substantially from the statistics and location of systems portrayed for these villages in the TSKR annexes and are not compatible with its envisioned waste management system, l*et a*lone the employment of modern waste collection equipment (Table 1). The poor condition of the collection points strongly affects the residents' willingness to utilise them, which consequently has negative effects on littering and illegal waste disposal in all villages.

Table 1. Waste management systems in case study villages (nd = no data).

Village	Collection infrastructure	Collection sites/containers in core village (observed)	Collection sites/containers in core village (TKSR)	Landfill disposal
Vedlozero	Metal containers for mixed waste & garbage truck for collection	17/22	4/8	Transport to Priazha district landfill
Naistenjärvi	Homemade wood framed pits/containers & excavator/tractor for emptying and transport	42/42	47/nd	Non-official/illegal landfill/dump in nearby forest & swampland
Tolvuja	Open collection points & garbage tractor twice a week	10/0	14/70	Temporary waste storage site used as landfill

Waste disposal following collection is another critical point that highlights the enormous challenges for rural communities to transform their waste management systems within the TSKR or similar schemes. In Vedlozero, waste is transported to the district landfill since the local landfill was closed and stabilised in 2018. Stabilisation in this case included covering the landfill with pressed soil and the installation of drainage ditches. No measures to prevent leachates seeping into the environment have been made and a small rivulet is freely making its course through the "remediated" site. Additionally, as there are no access restrictions, the site is used as an illegal dump and piles of new waste have accumulated since its closure. Yet, the situations in Naistenjärvi and Tolvuja are even more catastrophic due to the completely open and unprotected landfills/dumps. In both cases waste from the villages is dumped in specific open sites and is consequently widely spread by wind, water and animals. In Tolvuja, the landfill is officially ranked as a temporal waste storage site to be cleared each year, yet the last partial remediation was said to occur several years back by municipal officials (Interviewee 2). The use of temporal storage sites as permanent landfills is a common approach throughout Russia (Ivantsova 2016). In Naistenjärvi, the landfill is not an official waste disposal site hence it is illegal. In the three villages, only Vedlozero has experienced changes to its waste management system following the introduction of TSKR and the new waste fee. Yet, it has mainly been transferred from one insufficient site to another.

Local administrations in the villages are well aware of the problems and the harmful effects on the environment but they feel restricted by their financial capabilities, lack of expertise and insufficient support from the regional authorities. As one head of village put it, "The only change we feel is that everybody must now pay the fee […] nothing changed in the system. We have the same homemade containers, the same tractor comes and brings it to the forest dump" (Interviewee 3). The concerns of and challenges facing administrations are centred on how to afford and implement a suitable update of their local infrastructure. Yet, a mere update of the local collection point infrastructure faces additional problems.

First, installations of modern metal containers do not solve the landfill problems, as exemplified by happenings in a neighbouring village where "there is progress, they put metal containers everywhere and the garbage truck picks up waste. But then the truck brings the waste to the same forest dump. So the only difference is that it's more automated…" (Interviewee 4). Hence, there is not much improvement in environmental terms or fulfilling the TSKR objectives. Second, the restructuring of local waste collection points is confronted with multiple challenges. Budgetary restrictions largely reduce the amount of official collection points which leads to increased illegal dumping or other waste disposal forms such as burning. As a resident in Vedlozero explained, "The collection points are, in many cases, in places which are not reachable by the elderly. My parents cannot bring their waste for half a kilometre, so they don't use the containers" (Interviewee 5). On the contrary, Russian sanitary norms (SNR 2019, art. 2.2) prescribe a minimum distance of 20 metres and a maximum distance of 100 metres for all residential areas, which renders current potentials to restructure rural waste management legally impossible. As a representative of Avtospetstrans pointed out, "We are in big trouble, especially in the villages […]. In the cities it is mostly possible, in the countryside mostly not. […] We would need hundreds of collection points per village which is not possible" (Interviewee 6).

From the perspective of local administrators, a major problem is the insufficient, imprecise and non-transparent communication with higher authorities, like regional operator and district administrators. As there is no official roll-out plan communicated, the establishment of modern collection points by district administration in other settlements raises questions about the equal distribution of funds. Accounts about landfill remediation present similar situations, as the Head of Tolvuja stressed, "I will try to find money to clean it up, but it's a lot of money for our budget. I try to convince the regional operator and district administration to allocate money but who knows". Aside from financial restraints, these problems are linked to the unclear task sharing in the TSKR and who is responsible for the provision of equipment and clean ups if municipalities cannot afford them? Lack of communication is not only from the top down but *vice versa* as stated by a representative of Avtospetstrans that "...the situation is different in every district.[...] some are capable and responsible, others are irresponsible". As an example of the latter, Medvezhegorsky district, in which Tolvuja is situated, was mentioned as being beyond regional administrative reach as "we have no idea what is going on there, and we do not collect the waste handling fee there, it is all done by the local operator established by the district administration" (Interviewee 6). This is a stunning revelation considering the structured approach in the revised Russian waste legislation and the TSKR. It illustrates a level of mistrust and functional disconnect between administrative levels that jeopardises the general aims of the reform and leaves, particularly, rural communities as places to bear the consequences of an ill-functioning system.

Taking the village as a policy learning machine, in contrast to McFarlane's (2011b) employment of urban environments, helps to look further at local residents' perspectives to add another feature of the multiple relations that affect waste policy translation and implementation (Baker & McGuirk 2017). Similar to local administrators, residents expressed strong concerns about the waste situation in their own village but also claimed structural and cultural problems for the current situation. Generally, the situation was described as having deteriorated since the end of Soviet period, as this also ended the Soviet style environmental education and waste collection system that had created a rather strong reuse culture (e.g. Alabaeva *et al*. 2019). The deteriorated waste management systems known to all residents and their distrust in the responsible authorities strongly affects their willingness to engage in more progressive approaches like sorting. Common statements such as "...in the end it all goes to the same dump..." or "...the regional waste operator lies [about dump management]..." express the local discontent that derives from the current situation and the implementation of the reform currently limited to collecting the fee with little other improvements in most rural communities. A recurring demand from local residents in the survey was not only the improvement of the local collection infrastructure but also the ability of the new waste system and its authorities to establish a sufficient amount of trust to ensure that waste is handled and recycled properly following its collection. Both are rather challenging elements considering the financial, organisational and communication challenges described above in the Russian waste reform and the TSKR.

Finally, moving beyond the financial restrictions, responsibilities and infrastructure, we need to examine knowledge production and dissemination as an important part of environmental behaviour and conduct (Olofsson 2020). Here we separate knowledge into two key aspects: 1) knowledge about waste sorting, recycling and waste prevention, and 2) knowledge in relation to the waste reform implementation, including a transparent account of how future development is intended to be implemented. While the latter was considered completely insufficient throughout the case villages and was heavily criticised by other waste related stakeholders, like the recycling companies and NGOs approached for this study, the former requires some additional attention in relation to its role in potentially improving local waste management.

With the sorting experience of residents stemming predominantly from Soviet times, in the villages only the people older than 40 years remember directly the presence of available recycling systems, such as for waste papers and scrap metal. Hence, knowledge of recycling and waste management is distorted and requires scrutiny when planning and assessing residents' practices. The village survey indicated a waste sorting level of 64% in households despite the lack of local sorting facilities. On the surface this presents localities with an actively sorting population that should facilitate separate collection for recycling. Nevertheless, qualitative data from the interviews and informal communications revealed that sorting in most of these cases refers to burning paper and plastic in stoves or backyards,

and organic waste composting. While organic waste composting is in line with progressive waste management and recycling practices, the direct burning of waste portrays a rather different understanding of waste sorting than implied in most modern waste management systems or policy narratives. Local understanding of sorting is therefore not linked to current recycling practices and, as "many of us burn everything that is possible…" (Interviewee 5), it is tied to an understanding of heating one's house or 'neutralize' waste in the backyard instead of adding it to local landfills/dumps. That this creates other sources of environmental pollution and health hazards is seldom considered.

Aside from mistrust in the official waste management system, this environmentally harmful behaviour by villagers is also related to environmental education, or rather the lack thereof. The official reuse/recycling and intensive local clean-up campaigns common in Soviet times are marginal in today's rural villages. While there remains a culture of spring clean-up week, this has been confined largely to schools or to provide small jobs for the locally unemployed and merely scratches the surface of local littering by cleaning up school yards and roadsides. There is currently no specific environmental education that addresses waste management in the village schools. Additionally, adult residents receive little or no information about waste management or waste handling practices. Considering the role of residents as environmental citizens to engage in waste management (Olofsson 2020), this is a major problem that further challenges TSKR implementation. As one interviewee noted, "… educating people is the most important part of this reform. Nobody takes care of this now. There is a need for good, understandable lectures in the villages […]. Ordinary people are very far from these developments, especially in the countryside" (Interviewee 5). This lack of knowledge dissemination not only increases mistrust of the responsible authorities but creates a lethargy among residents instead of introducing them to potentials, future outlooks and alternative solutions.

The combination of ill-structured waste reform, its translations within the TSKR including the misrepresentation of local infrastructure, inappropriate financing instruments, and the lack of local knowledge and expertise are enhanced by challenges derived from the villages' peripheral locations. For example, the economic feasibility of transporting waste to the planned regional waste collection centres envisioned in the TSKR is questionable even when we ignore the fact that they do not currently exist. The final section connects the implications of the heterogeneous process linked to the villages and their relations of exteriority described above, hence the role of localized assembling with the policy reform as a currently incompatible transfer system. It further provides some key aspects on the lessons learned by approaching rural waste reform implementation through a policy mobility analyses and the value of rural implementation sites as learning machines for policy adjustment.

Discussion

This paper has assessed Russian waste policy reform and its mobility from national nodes of design via regional translation towards local implementation processes, with a particular focus to assess the interrelations of generic policy capacities to integrate localized assembling processes (e.g. McCann 2013; Peck & Theodore 2015). It has compiled key components that (re-)produce and help understand the localised assemblages that result in variegated policy implementations (Savage 2019), or rather implementation potentials and challenges of rural waste management transformation. To employ the full potential of the village as a policy learning machine for rural waste policy development (e.g. McFarlane 2011b), the remainder of the paper is structured twofold. First, we wrap up the practical implications that derive from the mismatch between policy features and localized assembling processes and provide key suggestion to address the current situation. Second, we conclude on the value and potential that derive from the conceptual approach on waste policy mobility and translation research.

The main objectives of the waste reform aim to establish a functional system of waste management, raise the recycling rate to 36% by 2024 and remediate environmentally harmful landfills and provide a cleaner living environment (MNR 2020). Urban centres, confronted with multiple challenges that go beyond the scope of this paper, play the key role in the reform while rural areas are largely marginalised and not understood to require special attention in the revised legislation (DGR 2018). Looking at the socio-spatial features in the case study villages and at peripheral rural dwellings throughout Russia, the implementation of policy trajectories seems like a mission heading towards failure. Regarding the

TSKR, there are not only mismatches between the policy planning foundations (e.g. statistical data) and local realities, but the policy structures of the regional translation leave no room to tackle local peculiarities due to its non-transparent design, unclear responsibilities and task sharing, and the communicative incapability of involved entities. Additionally, communities lack the expertise, infrastructure and (financial) support to act despite their willingness to do so. Hence, considering the importance for mobile policies to be responsive to the socio-spatial processes at the policies' resting places and the role of knowledge on these localizations in policy learning (Clarke *et al*. 2015; Peck & Theodore 2015; Wood 2016), the study clearly shows that the black boxing apparent in the current Russian policy system is destined to contestation, if not failure. The short timeframe to reach objectives, while ambitious, leads to insecurity and quick fixes such as installing a couple of containers somewhere rather than carefully establishing a well-planned and structured system. As the head of Avtospetstrans pointed out comparing the Finnish and Russian waste systems: "What Finns have achieved in the last 25 years our policy intends to do in 5 years…". Considering the rudimentary situation in many rural communities, it is doubtful that a policy with an urban focus, limited and largely dysfunctional financial framework, and a poorly expressed responsibility structure can deliver any of its objectives for rural areas on an evenly distributed basis.

The cases present the problematic aspects of policy transfer systems and policy-makers' believe in their conceptualizations and, consequently, their integration to policy instruments, such as the TSKR (e.g. Dolowitz & Marsh 2000). This too, often results in policy systems based on biased numerical indicators that treat localities as quantifiable containers instead of integrating instruments or support mechanisms suitable for their multiple needs and multiple socio-spatial features (e.g. Peck & Theodore 2015; Albrecht & Lukkarinen 2020), which would be a key feature to improve the mobility of Russian waste reform for rural localities. Another key aspect is the lack of processual integration in the policy design, hence the failure or unwillingness to understand the connectivity of complex local processes and characteristics of material flows and the policy requirements deriving thereof. For instance, even though the current system succeeds in installing proper waste collection points in the villages, its recent financial and structural composition is not suited to address the multiple pending problems, such as illegal and insufficient landfill remediation, littering, and lack of sorting – not even to speak of the socio-cultural changes required for this transformation.

On the contrary, the reduction of collection points due to municipal financial restraints when installing state of the art containers, for instance, is likely to lead to illegal dumping if people consider them beyond their reach. This will be particularly true if authorities are not able to create a system of trust that convincingly manages and disseminates knowledge about solving the challenges related to downstream waste streams such as harmful/illegal landfilling as opposed to recycling. Furthermore, while envisioned in the TSKR and the Russian waste policy, there are no functional supportive instruments such as educational programmes for household sorting and separate waste collection as it is designed to be established through private investments and entrepreneurs. This is problematic in urban environments in relation to the active engagement of citizen (e.g. Olofsson 2020), but even more so in rural municipalities due to the socio-economic limitations described above. The issues mentioned above provide a core bundle of aspects that must be integrated to remediate some of the mismatches between policy aims and rural implementation realities.

Finally, this bundle of potential improvements need to be accompanied by secure and clearly marked funds for rural waste management, as the naïve vision of self-financing waste reform is not supported by any of our findings. In practice the current system, due to its unstructured, non-transparent approach and its policy instrument misalignment with local realities, is prone to create a self-undermining system that fosters a business as usual (illegal) disposal reaction rather than encouraging and facilitating waste management based on sorting and recycling. Compounding this issue is the fact that local residents, and sometimes local administrations, are neither informed nor allowed to participate in most waste related decision making beyond their village's territorial limits. Hence, even if a village establishes its own sorting and collection system, it is confronted with a largely dysfunctional transport and waste processing system, and the waste is likely to end up in an environmentally harmful landfill.

Turning to the conceptual implications of the paper, we have highlighted and exemplified the academic value of policy mobility assemblages as a methodological-analytical instrument (Baker &

McGuirk 2017; Savage 2019) for the study of rural policy processes beyond expert circles. This, to assess not merely best practice travel of policy ideas (McCann 2013) but as a scientific tool to evaluate socio-spatial processes and rural policy translation. By including every day realities that reproduce contestation and marginalization it entails the potential to highlight the misfits related to indifferently designed policy trajectories. Studying local implementation and translation processes through assemblage methodology enabled us to employ the village as a learning machine (McFarlane 2011b), contrary to its representation as socio-economic fixed container employed in many networks of policy design, including the Russian waste reform. Yet, this requires more than following the policy and its networks (McCann & Ward 2012b). It expects a serious integration of the methodological commitments portrayed by Baker and McGuirk (2017) into in-depth empirical work employing a mix of policy assemblage evaluation with assemblage based locality studies (e.g. Woods 2016). Additionally, it unveiled many incoherent features of the current reform with the needs of rural waste management (e.g. responsibility structure, communication, finance), and thereby opens up questions to be scrutinized in the spheres of policy design non-accessible without such localized analysis. Consequently, it encourages a more grounded policy mobility research approach that, in combination with an analysis as performed in this paper, follows policy additionally in a revised fashion from implementation localities to places of design rather than to move with the direction of policy implementation only (e.g. from design to locality). This is particularly so when studying policy mobility failures, contrary to studying the boosting of "successful" policies (e.g. McCann 2013). Aside its benefits for policy mobility research such a revised assessment would also help policy learning networks, such as the institutional entities involved in the TSKR, to understand its own insufficiencies that have resulted in the current dysfunctional system.

Conclusion

The current approach to transform waste management in rural communities through the revised Russian waste legislation and in this case the TSKR is heading towards building up a ruin to come. Looking at the policy translation and implementation through an assemblage perspective has revealed a dysfunctional and contested waste management system since its origin. It not only lacks supportive tools for rural communities, but creates institutional and individual resistance based on neglect, misrepresentation and unequal treatment of rural communities. Finally, while waste and recycling entrepreneurs can fill the gap left by the State in urban areas to some degree, our research has shown that extending their reach and potentials into rural communities requires external support. Thus, current potentials to establish alternative waste management solutions that include household sorting and directing waste streams to recycling rather than landfills in rural Russian communities have to be created entirely from locally embedded initiatives. Unfortunately, due to the challenging socio-economic situation in most rural villages, this remains largely utopic without external support.

This paper has presented an array of localised processes that affect the mobility and translation of policy instruments, such as the TSKR and the Russian waste legislation, in their potential to deliver or rather fail to deliver their policy objectives. In the case of the Russian waste reform, the findings highlight the urgent need for policy makers to employ localities and their socio-spatial characteristics as policy learning tools to amend the currently insufficient policy design and frameworks rather than trying to find blueprints from elsewhere. While this study has been framed as an in depth and empirical rooted case study the findings nonetheless contain much value for generalization on waste policy mobility and its current inability to integrate socio-spatial localization processes in Russia but also elsewhere. This further stresses the crucial role of accurate (geographical) knowledge provision and use, transparent communication and acceptance of local realities to encourage local trust in a potential future system.

Notes

[1]Key legislative reform components of this policy package have been amended in 2018. While the legislation is constantly amended in bit and pieces the analysis rests predominantly on the core amendments of 2018 why the reference FL 1998/2018 is employed throughout the article.

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