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***Viewpoint* – Water Innovation for a Circular Economy: The Contribution of Grassroots Actors**

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ABSTRACT: European policy discourse on circular economy tends to focus on innovation in relation to business and especially industry. Research suggests, however, that in order to achieve successful transitions to circular economy all social actors must be considered. Institutional pluralism and a variety of modes of provision – market, public and communal – offer a framework for research on water innovation and circular economy not limited only to markets. The paper explores such a comprehensive perspective, with a focus on grassroots innovations and their contribution to circular economy. An exploratory study of three cases of such water innovation highlights the civic, communal, and nature conservation values that these innovations advance. It also points to alternative land and water use options, along with complementary practices beyond a purely efficiency-oriented focus. For innovation policy, it suggests a focus on the support of civil networks and their coordination capacities.

KEYWORDS: Circular economy, social innovation, grassroots innovation, water ethics, water innovation, European Union

INTRODUCTION

Circular economy aims at the minimisation of resource use and waste, at longevity of products and materials, and at the reuse of products for a more sustainable development.¹ For example, if urine and faecal matter is collected rather than flushed away, there is a potential for reuse of these resources as fertiliser or for energy production, though closing the loop between potential and actual use is easier said than done. Dry toilets often are perceived as old-fashioned and unpleasant, and thus even innovative initiatives encounter psychological resistance. There are institutional challenges as well, as reuse of human 'waste' is often prohibited. Thus, the prima facie attractive and elegant idea of a circular economy is in practice meeting resistance.

However, innovators are distinguished by their capacity for carrying out new ideas, even against psychological and social resistance (Swedberg, 2009). It is only fitting, therefore, that the idea of circular economy should be accompanied and advanced by innovations towards equitable and sustainable economies. The prevailing innovation focus is on industry, along the value chain of production and consumption (Ellen MacArthur Foundation, 2012). Such a focus risks excluding other types of innovation, thereby undermining the potential of innovation as a vehicle for change towards circular economy. As

¹There is no single shared definition of circular economy. See Kirchherr et al. (2017) for a recent review of 114 circular economy definitions. Based on their review, they recommend the definition by van Buren et al. (2016): "Reducing the consumption of raw materials, designing products in such a manner that they can easily be taken apart and reused after use (eco-design), prolonging the lifespan of products through maintenance and repair, and the use of recyclables in products and recovering raw materials from waste flows. A circular economy aims for the creation of economic value (the economic value of materials or products increases), the creation of social value (minimization of social value destruction throughout the entire system, such as the prevention of unhealthy working conditions in the extraction of raw materials and reuse) as well as value creation in terms of the environment (resilience of natural resources)".

indicated by the toilet example above, individual change at home and the associated self- and communal-provision practices also matter. So what about water innovation for circular economy beyond the prevailing focus on industry and market provision? What about grassroots actors?

The first section turns to innovation in one of the most active circular economy policy contexts worldwide: the European Union. It tracks the use of innovation via the Circular Economy Action Plan, with a primary focus on industry and markets. There are important circular economy initiatives on the national, regional and municipal levels. Still, a focus on the core of the EU circular economy policy discourse is of interest for its own sake, but also because of the EU-level influence on these other levels (as is familiar from water and agricultural legislation). The section situates this focus in a comprehensive account of the economy and its various modes of provision: not only market but also public and communal provision. It introduces a typology of innovation – business, public and grassroots – associated with these modes. Contrasting the prevailing discourse on market provision and business innovation, this viewpoint specifically suggests a focus on water alternatives proposed by grassroots innovators, i.e. innovation emerging from civil society actors.

Prior to the presentation of such grassroots innovation, the following section turns to evaluation. Circular economy is conducive to research that is "approbatory, uncritical, descriptive and deeply normative" (Gregson et al., 2015: 219). A focus on industry and markets is problematic as it tends to exclude and marginalise the sustainability and nature-protection ideas and practices of other social actors. These actors' roles and motivations are key to the exploration of alternative domestic, communal and public approaches to decoupling economic growth from resource use. This section, therefore, situates economic value within basic categories of intrinsic, instrumental and relational value in preparation for an approach that is, to paraphrase, critically approving as well as analytically and explicitly normative.

The third section turns to three examples of grassroots innovation in relation to water management in a circular economy context. These cases were selected from the social innovation databases made available by the last wave of European social innovation research, which has established a rich repertoire of innovation case studies.² Only European cases were considered, in keeping with the focus (as stated above) on the European circular economy discourse and, within this, only on those with a water focus. For each of the cases below, access was available to the case studies, to associated desktop material in the form of research and grey literature, as well as to interviews conducted with people involved in the respective innovations. Following a brief presentation of the innovation in each case, the grassroots origin is explained and the role of water values explored. Finally, based on this presentation, the last section concludes with implications for research and policy.

CIRCULAR ECONOMY AND INNOVATION

According to the Circular Economy Action Plan of the European Union (European Commission, 2015: 2), a circular economy is one where "the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimised, [it] is an essential contribution to the EU's efforts to develop a sustainable, low carbon, resource efficient and competitive economy". Such an economy is posited as a desirable objective, the achievement of which will require systemic change (ibid: 18). Paradigmatic areas of circular economy so far are industrial ecology and extended product life (Gregson et al., 2015).

² 1094 cases in total. They are available open access via a) the comprehensive case studies of CrESSI (www.sbs.ox.ac.uk/creating-economic-space-social-innovation); b) SI-Drive global mapping (<https://mapping.si-drive.eu/>); c) the SIMPACT cases (www.simpact-project.eu/evidence/sicases/index.htm); and d) the TRANSIT case study reports (www.transitsocialinnovation.eu/case-studiesSimpact) – all accessed 25 April 2018.

Circular economy is presented in the action plan as a contribution to more general goals which include sustainability and the carrying capacity of the earth, water quality, biodiversity, low carbon economy, resource efficiency, competitiveness of the EU in the global context, security (in the face of global resource scarcity and price fluctuations), social integration and cohesion, and job creation (European Commission, 2015: 2). While each of these goals might not be very surprising, their combination raises issues. Sustainability is supported by the circular economy goal of decoupling environmental pressures from economic growth (Ghisellini et al., 2016). Critics point out, however, that combining this goal with the affirmation of competitiveness and growth goals carries the risk that the gains from circular economy will be eaten up by economic growth (Spangenberg, 2017). A focus on competitiveness introduces a focus on the EU and its member states as competitors in a global contest, even though major sustainability challenges are of a global nature. For example, the global recovery and recycling of European waste is seen as bad, even though it accounts for one of the most active parts of recovery and recycling – the reason being a concern with resource loss for the EU, in particular the loss of rare-earth metals. Priority is thus given to circular economy within Europe, partly due to a concern with resource security (Gregson et al., 2015: 220). This points to the important role of values in circular economy, a topic that will be further discussed in the next section.

A key vehicle for systemic change, according to the action plan, is innovation in "new technologies, processes, services and business models which will shape the future of our economy and society" (European Commission, 2015: 18). Public and private investors, so states the report, are needed to "scale up improved technologies and processes, develop infrastructure and increase cooperation between actors in the value chain" (ibid: 18). This innovation focus is mirrored by academic contributions calling for a better understanding of business and business models as enablers of circular economy. "Much more emphasis on business models will be needed in future discourses if the private sector is supposed to lead the transitions towards circular economy" (Kirchherr et al., 2017: 228).³

The innovation process in the EU action plan is portrayed as driven by "economic actors, such as business and consumers" (European Commission, 2015: 2). Regional and national authorities, as well as the EU, are called on to support the transition, not least with the right regulation and investment. Civil society in the form of non-governmental organisations and associations are not explicitly mentioned in the plan. However, citizens are mentioned in their potential role as advancing new forms of consumption. In addition, social enterprises⁴ are referred to as "key contributors" in fields such as recycling, repair, and innovation (ibid: 19). The importance of a wider actor focus is supported by circular economy research. A literature review of circular economy initiatives concludes that a "lesson learned from successful experiences is that the transition towards circular economy comes from the involvement of all actors of the society and their capacity to link and create suitable collaboration and exchange patterns" (Ghisellini et al., 2016: 11).

However, what would a more comprehensive image of collaboration and innovation beyond business and consumers look like? In addition to the provision of goods and services in markets, there are modes

³ See also Korhonen et al. (2018: 545), who claim that the "circular economy approach has almost exclusively been developed and led by practitioners, i.e., policy-makers and business development agencies such as business consultants, business associations, business foundations, etc". This discourse constellation would explain the prevailing narrow image of the economy in some of the circular economy literature. However, as the same authors note, the intellectual origins of circular economy in ecological economics are much wider.

⁴ The European Commission (2018) defines a social enterprise as "an operator in the social economy whose main objective is to have a social impact rather than make a profit for their owners or shareholders. It operates by providing goods and services for the market in an entrepreneurial and innovative fashion and uses its profits primarily to achieve social objectives. It is managed in an open and responsible manner and, in particular, involves employees, consumers and stakeholders affected by its commercial activities".

of self and informal provision.⁵ These are based on domestic and communal labour, not on consumer choices (for example gardening and the domestic use of dry toilets). Communal norms of reciprocity, solidarity and place govern such provision. In addition, there is public provision based on the coercive power of the state and political decision-making processes. Frequently across Europe, for example, freshwater is provided by public water operators.

These modes of provision suggest a variety of sources and modes of innovation beyond those highlighted in the EU action plan. Next to the familiar and well-studied business innovation in markets (Havas, 2016), there is public innovation (Sørensen, 2017). It comprises public service innovation and political innovation that advance new ideas about public values and the associated changes in perceptions and procedures. As *democratic* innovation (Smith, 2009), this can refer to new participatory roles – of citizens, for example, holding water providers accountable via municipal water tables (Härlin, 2017). Finally, there is grassroots innovation, which refers to initiatives from civil society entities such as local communities and various kinds of associations.

Networks of activists and organizations generating novel bottom-up solutions for sustainable development; solutions that respond to the local solution and the interests and values of the communities involved. In contrast to mainstream business greening, grassroots initiatives operate in civil society and involve committed activists experimenting with social innovations as well as using greener technologies (Seyfang and Smith, 2007: 585).

The typology is a simplification of a much more complex reality. Modes of provision blur in practice, as do actors who often collaborate across such modes. This suggests, as a final point, the transversal category of social innovation as one comprising innovations from all these modes as long as they are not primarily aimed at maximising profit (an economic value), but rather are mainly aimed at supporting and generating social and environmental values.⁶

Beyond social innovation there are many further collaborations and process across these modes. The recent discussion of mission-oriented research and innovation policy in the EU, for example, explores the role of the state and public research in directed innovation clusters – primarily in market provision – on "missions" such as climate neutrality (European Commission, 2019). Moreover, market actors sometimes imitate or steal communal innovations as, for example, in biopiracy of local agricultural innovation⁷ (just as governments sometimes imitate or steal innovation from market actors, especially from other countries). In short, the typology does not claim that alternative sources of innovation cannot be (mis)used in more established ways or via new collaborations. Rather, the typology seeks to provide a heuristic that points to a source of innovation beyond an exclusive focus on markets, the state, and public – private partnerships: civil society initiatives advancing innovative circular economy solutions or ways of coordinating among various social actors. Such actors are not easily captured conceptually, even by the concept social enterprise mentioned in the EU action plan, as they might not offer goods and services drawing on money and market exchange. Yet, as noted in a recent overview article on innovations with environmental impact, "non-governmental and non-profit organizations are frequent initiators of social innovation initiatives" (Schartinger, 2018: 177).

There seems to be an obvious gap, however, even in such a more-comprehensive typology of sources of innovation: nature itself. What about provision by nature? Nature cannot be framed as an innovator for circular economy in the sense of an intentional actor pursuing innovation for society, let alone the

⁵ For a detailed account of such mixed economies and the associated institutional pluralism, see Ziegler and von Jacobi (2018), which draws on prior work by Anderson (1993) and Claassen (2009). It also includes a discussion of professional provision, omitted here for simplicity.

⁶ For an overview see Howaldt et al. (2018).

⁷ I would like to thank the editors for this example.

goals of the EU. Still, there is novelty and creativity in nature. One way of taking this point into account is via the concept of nature-based solutions (NBS). These are:

[i]nspired and supported by nature and use, or mimic, natural processes to contribute to improved management... An NBS can involve conserving or rehabilitating natural ecosystems and/or the enhancement or creation of natural processes in modified or artificial ecosystems. They can be applied at micro- (e.g. a dry toilet) or macro- (e.g. landscape) scales (WWAP, 2018: 14).

Examples of such nature-based solutions include green roofs for rainwater retention, restored or constructed wetlands for nutrient and water retention, and vertical greening of houses for cooling.

All innovations, whether in or across communal, public and market provision, can be inspired by or supported by nature.⁸ This especially pertains to innovation for circular economy, given that regenerative processes are already an inspiration for the very idea of circular economy. Water cycling through nature and society, in particular, has been identified as an important inspiration for circular economy (Sauvé and Comeau, 2016). Indeed, nature-based solutions are claimed to promote "greater resource productivity aiming to reduce waste and avoid pollution, including through reuse and recycling" (WWAP, 2018: 15). They are contrasted to a "linear economy" of a take-make-dispose model of production (ibid: 35).

A nature-based solution such as a constructed wetland has a variety of benefits. Perhaps introduced for nutrient retention, it likely is valuable also for biodiversity and recreation, carbon storing, and water retention. However, such co-benefits are difficult to market (Raven et al., 2018). This underlines the importance of not limiting circular economy to market provision in order to better value and advance such co-benefits. As with social innovation above, this point again takes us to valuation beyond market-related values.

VALUATION AND INNOVATION

The dominant value focus in the circular economy discourse discussed above is on exchange value for market provision. The EU action plan presents circular economy as a value-maintenance and value-discovery approach.

The transition to a more circular economy, where the value of products, materials and resources is *maintained* in the economy for *as long as possible*, and the generation of *waste minimised*, is an essential contribution to the EU's efforts to develop a sustainable, low carbon, resource efficient and competitive economy (European Commission, 2015: 2, emphasis added).

In short, value maintenance is about longer-lasting and durable products, while value discovery is about new ways of using waste. "High-value waste streams, such as end-of-life vehicles, will be targeted specifically, to prevent raw materials leakage" (ibid: 10). One goal is to "transform waste into high value-added products" (ibid: 8). As the qualifier "added" in the quote indicates, however, this is no automatic process, it requires work and often complex and challenging cooperation (ibid; Gregson et al., 2015).

A similar point can be observed with regard to the emerging field of water ethics. Groenfeldt (2013: 5) calls economic value the most "obvious value/ethics category" in the field. Much water innovation is about new business opportunities in markets. However, Groenfeldt (ibid) hastens to add further environmental, social and cultural value categories. In addition to a diversity of values, there is the question of their ordering. Feitelson (2017) positions market needs at the bottom of a hierarchy, below political and ethical needs. The emerging water ethics literature thus points to a large diversity of valuation issues.

⁸ This is a point that also goes some way in dealing with the philosophical worry that the talk of nature-based solutions suggests that in 'other' innovations there is somehow a strict separation between nature and artefacts.

Richer value frameworks that extend beyond economic value fit well with a comprehensive account of the economy and its sources of innovation. As noted above, social innovation points to social and environmental goals beyond profit maximisation and, likewise, nature-based solutions' co-benefits are difficult to capture only in monetary terms. Social and environmental values and their co-benefits are central to the goals and processes of alternative sources of innovation for circular economy. This section therefore introduces the basic value categories to be drawn on below, in order to present alternative sources of water innovation. Environmental ethics, the branch of philosophy investigating our relation to the natural environment, distinguishes three main value categories: intrinsic (of two kinds), instrumental, and relational.

Intrinsic Value 1: This value category draws on the philosophy of Immanuel Kant: "In the kingdom of ends everything has either a price or a dignity" (Kant, 1998: 42f). Price is an expression of relative worth that depends on human needs and wants. Things that have a price can be exchanged on the market; they can be substituted. By contrast, that which sets itself a purpose or end has inner worth and dignity. It demands respect. But who should be respected? Who are the members of the moral community – humans, sentient beings, living beings, ecosystems, everything? By implication, who deserves respect when thinking about value in circular economy: only humans, or also animals, or also wetlands and rivers? The Kantian use has an important provision-constraining and provision-accompanying function.⁹ This function is evidenced by commodification controversies over what beings and doings can be 'for sale' (constraining function), or by 'moral markets' generating green and social products (accompanying function). In addition, intrinsic value raises a distributive challenge within the community: are all members of the community to be considered equally, in recognition of their intrinsic value? Can we 'solve' water pollution problems by displacing them to poorer or distant populations (Kjellén, 2018)? Finally, the intrinsic value finds expression in governance in the form of a consideration of the stakeholders and ultimately of civic value: do citizens have a say and an opportunity to reflect on, deliberate and participate in decisions that affect them as ends rather than only as means?

Intrinsic Value 2: Next to this Kantian tradition, there is an Aristotelian use, with intrinsic value referring to actions and states that are valued for their own sake (O'Neill et al., 2008: 114). I might enjoy a walk along a river for the sake of it. The Aristotelian use has a value-discovery function: it points to actions that might have no price yet are intrinsically valuable. As circular economy requires changes in practices, this category points to valuable activities and practices that might offer attractive substitutes for more resource-intensive ones, and also potentially new markets. In civic humanism this Aristotelian tradition is alive with respect to political participation and active citizenship as essential for the good life (in contrast to the liberal emphasis on political participation as an opportunity rather than a requirement).

Instrumental Value: This refers to an activity or state that is valuable for the sake of something else. For example, drinking water is of instrumental value for nutrition and health, and wetlands that remove nutrients from agricultural run-off are of instrumental value for river quality. Much of the ecosystem-service discussion is about tracking instrumental values. As that discussion shows, the challenge is to account for the large variety and interconnectedness of instrumental values. Approaches such as the Millennium Ecosystem Assessment therefore also have a value-discovery function that can be market-accompanying (when new such values are discovered), though such approaches also point to constraints via enabling function (supporting and regulating services).

Relational Value: In addition to the well-established discussion of intrinsic and instrumental values, there is the further category of relational values. Relational values have been identified as those that "link and enliven" instrumental and intrinsic values (Chan et al., 2016: 1462f): "preferences, principles, and virtues associated with relationships, both interpersonal and as articulated by policies and social norms". Many relational values concern the environmental and social – cultural relations we already find

⁹ Generalised from Beckert (2011), who uses this terminology in relation to markets.

ourselves "in" as a condition for acting as individuals with ends (Muraca, 2016: 119). The relational-value category refers to language and cultural heritage. A practical implication of this category is to pay attention to the cultural narratives and sense of place that people are already "in" (Chan et al., 2016: 1463), and that are sources of the motivational we for nature and culture protection. Relational values have an enabling function for market exchanges and the reciprocity and trust that these exchanges presuppose (see Beckert, 2011). They also support the reciprocity in communal provision and the basic respect required for democratic politics, but as particular narratives of identity and tradition they can play a divisive, exclusionary role.

WATER INNOVATION AND CIRCULAR ECONOMY – CONTRIBUTIONS FROM THE GRASSROOTS¹⁰

Ľudia a voda (People and Water), Slovakia¹¹

In response to plans for the construction of a large dam in Eastern Slovakia in the 1990s, Michal Kravčík and his collaborators from the civil society association People and Water proposed an alternative, first called *The Blue Alternative* and later the *New Water Paradigm* (Kravčík et al., 2007). Rather than building large dams downstream, The Blue Alternative prioritises multiple, small-scale water retention possibilities on upstream land. According to this alternative view, modern Slovak water management does not sufficiently recognise the value of rainwater retention for landscape cooling, soil health, biodiversity, and flood prevention. Instead, it tends to see rainwater as a problem to be channelled out of the landscape and cities as quickly as possible. As the authors of the New Water Paradigm argue, the result is an increased risk of drought as well as floods. Rainwater is no longer sufficiently kept in the soil when it arrives, thereby reducing the small water cycle. According to the authors, this is also an economic loss, because upstream water retention can create jobs and replenish the land for agriculture and biodiversity. People and Water's mission is to

provide services to urban and rural communities, mostly within the Carpathian Euro region. The goals are to solve the economic, social, cultural and environmental problems on a grassroots level by encouraging citizens to be proactive through development, renewal and promotion of the traditional culture and diversity of the region. (cited in Lodemann and Ziegler 2014: 82¹²)

People and Water successfully stopped the building of a dam near Tichy Potok in the Levoča Mountains, and initiated a countrywide landscape revitalisation programme from 2010 to 2012, along with numerous smaller projects. For his work, People and Water's Michal Kravčík has been recognised as a social entrepreneur and has received a Goldman Environment Prize and an EU-US Democracy and Civil Society Award (Lodemann and Ziegler, 2014: 102). In terms of the circular economy, the organisation works for a (re)discovery of rainwater as a valuable resource, and not as something to be channelled away from the land as quickly as possible. It claims that improved rainwater retention in agriculture and forestry reduces the demand for large-water dams downstream and creates value upstream through ground water replenishment and improved conditions for plant growth.¹³

People and Water emphasises the responsibility and rights of local actors in the management of water on their land. This position fuels the protest against large-dam construction implemented top-down by national agencies in cooperation with water companies, and it motivates the goal of providing communities with practical means to implement the New Water Paradigm at home. In practice, these

¹⁰ Contact the author for an extended version of this article, including the example of community-supported agriculture.

¹¹ The subsequent paragraphs are based on Lodemann (2014) and Lodemann and Ziegler (2014).

¹² See also Ľudia a voda (2018), in Slovak: www.ludiaavoda.sk/28-sk/o-nas/

¹³ This is a point that is especially well demonstrated in arid geographies where there is potential for rainwater catchment. For an illustration of this point within the ecovillage movement, see the work of the Tamera community in Portugal (Kunze and Avelino, 2015).

water retention projects are mainly driven by volunteers or by public funding schemes (for example, European and national funds in the case of its landscape revitalisation programme). Although the association is not opposed to a business case for its ideas, the main modes of provision have been informal and public in accordance with the grassroots emphasis of its mission.

In line with this focus, the association primarily addresses citizens. It seeks to communicate an improved knowledge of the water cycle, with the goal that this knowledge in turn will inform the ends and actions of citizens in their roles as farmers, forest workers, home owners, etc. Its focus is thus primarily on the intrinsic value of humans as citizens in their local context, and the strengthening of their civic capacity and responsibility to act for themselves. It supports its case by pointing to the instrumental values linked to the New Water Paradigm: reduced flood risks, ground water replenishment, local job creation, and more generally a revitalisation of the landscape. There is no indication that the organisation is against a consideration of the intrinsic value of other living beings, but such consideration receives much less attention. Relational value can be discovered in the background of the approach. The case against the 'old paradigm' – roughly speaking, the narrative of modernist large-dam development policy – is made in terms of a 'new paradigm' that puts the emphasis on subsidiarity and local empowerment in the watershed. But the 'new' subtly recalls the 'old': the 'new paradigm' is said to revive an old insight of farmers before modernisation (Lodemann and Ziegler, 2014: 84-86) and, as the organisation's mission statement puts it, to "renew and promote" traditional culture.

IKT (Interest Community for Communal Drinking Water Provision in Bavaria), Germany¹⁴

The IKT network of grassroots innovators also originated with a dam protest. In the late 1970s/early 1980s the Bavarian government wanted to build a dam for a drinking water reservoir in the Hafenlohr Valley. According to its water-management plan, the nearby town of Würzburg was threatened by a water shortage due to an expected increase in water consumption and a decrease in unpolluted drinking water sources, not least due to an increase in intensive agriculture. A citizens' initiative challenged the water-scarcity diagnosis and successfully protested against the dam in favour of what it calls an area-covering approach: ecological restoration of the areas in order to avoid further contamination by nitrates, other fertilisers, or even pesticides that had been polluting the catchment area of local drinking water sources. As many villages and hamlets faced similar challenges in protecting their local drinking water sources against centralising tendencies, they formed a network of citizens' initiatives, the IKT. Its goal was to promote decentralised, communal drinking water provision and, as of 2001, also decentralised wastewater treatment.

It is an alternative to central water provision that puts the circular economy focus on the *reduction* of resource use (fertilisers, pesticides) in drinking water catchments, and on the local separation and retention of nutrients in wastewater treatment. It views its decentralised drinking and wastewater management as "exactly corresponding to the circular economy demanded by local Agenda 21" (IKT, 2001: 7), and it frames this point as being about restoring economic value and prosperity, repeatedly using the metaphor of its water as "communal silverware" that should not be sold but rather cared for (Ziegler, 2017: 31).

The mode of provision tends to be informal (citizens associations organising the water supply/wastewater treatment in hamlets and small settlements) or public (the village or town operates the water supply). Its origin as a citizens' association established in 1986 provides an excellent example of the "network of activists and organizations" referred to in the grassroots innovation literature (Seyfang and Smith, 2007: 585). Its "bottom-up solutions" (ibid), however, are not so much technological – although there are examples of some experimentation with filters that is novel in their context – but rather organisational: the creation of a network that gathers knowledge, validates experience in peer

¹⁴ Translated from German: Interessengemeinschaft Kommunale Trinkwasserversorgung in Bayern. See IKT Bayern. Available at <http://ikt-bayern.de/verein/uber-uns/> (accessed 25 April 2018). The subsequent paragraphs are based on Ziegler (2017).

meetings, and develops practices to restore local water traditions in order to meet new drinking water and environmental standards.

At the centre of this effort are citizens struggling against central political and economic powers, and fighting for their right to co-determine important water management decisions. For its members, a main value of the network is its ability to foster local group formation and to support their ability to speak for themselves, not least in discussion with water and construction experts who might look down on 'villagers'. Nature conservation associations are among the network's most important allies, with individuals often being members of both IKT and nature conservation associations. The consideration of other species, and of the environment in general, plays an important role. For example, the above-mentioned Hafenlohr Valley is now a nature conservation area.

The circular economy efforts of IKT reposition familiar instrumental values of circular economy discourse. In its view, the principle of circular economy promotes a "great *security* of provision" and a "high drinking water quality" (IKT, 2007: 6; emphasis added). In their view this result derives from the circular economy principle of "choos[ing] local produce wherever possible" (ibid), thus yielding a local rather than a national security argument for circular economy.

Relational value is also important. Opponents frame the IKT as left-behind, premodern hillbillies (Ziegler, 2017: 102f, 118). The IKT actively counters this framing by speaking of communal water protection "at your doorstep", an approach that appeals to the idea of homeland (German: *Heimat*), the heritage of prior generations (who built and managed local water supply), the responsibility for grandchildren, and the strengthening of the local economy (ibid: 51f). More subtly, there is a cognitive model that frames circular economy as natural: "Life on this planet is only possible due to circular economy" (IKT, 2004: 10). It is accompanied by the argument that strictly speaking there is no such thing as wastewater: 'waste' in water is a 'resource' for bacteria and plants.

Big Jump – European Rivers Network¹⁵

The European Rivers Network (ERN) originated with protests against dam construction on the Loire in the 1980s (Partzsch et al., 2014). An important lesson emerged from the successful anti-dam campaign: the strategic importance of including the public in environmental protests all along the river, source to mouth. The Big Jump, coordinated by the ERN, was an innovative way of doing this. First organised in 2002 as a swimming day along the Elbe River in Central Europe, in 2005 it became an annual European river-swimming day, both events coordinated by ERN director Roberto Epple. On a particular day, citizens are invited to jump simultaneously into their rivers in order to reconcile with the river, to create public attention for river management, and to press for the implementation of the EU Water Framework Directive.

Unlike other examples of innovative initiatives, in this case there is *prima facie* no economic provision at all. The focus, rather, is on an intrinsically joyful activity (swimming), and relationship with others (joint swimming) and, through these important social activities, reconnecting with the river. At the same time, the public action of humans as 'bioindicators'¹⁶ of river quality puts the emphasis on an environment without pollution and, via the jump, symbolically conveys the idea of a living, unconstrained river. This provides an example of a prefigurative practice that offers alternatives to material-intensive consumption, i.e. in this case joyful ways of being together in nature. However, the ERN does not leave it at that. It also seeks to highlight the value of pristine (river) nature. Communities can apply for a *wild*

¹⁵ Big Jump is an initiative of the European Rivers Network (Big Jump 2018). The subsequent paragraphs are based on Partzsch et al. (2014).

¹⁶ This term is in single quotation marks because water quality for swimming has some overlaps with – but is not equivalent to – the good condition of rivers (as defined by the Water Framework Directive).

rivers label,¹⁷ obtained following a standardised process according to almost 50 socio-ecological criteria. If there is more than 10 percent intensive agriculture or sealed settlement land in the area, then that water body is eliminated. Thus, again, this puts pressure on more material-intensive practices, while simultaneously offering an alternative value source indicated by the wild river label. Finally, the ERN campaigns for a change in agricultural practices to reduce its overall water use, along with reductions in fertiliser and pesticide use, so as to meet the goals of the European Water Framework Directive.¹⁸ In these ways, the ERN is an innovative grassroots network. For this work ERN director Epple received an award as a social entrepreneur, and a EuroNatur Award for Environment Excellence.

The Big Jump invites citizens to reclaim their rivers and it situates itself as part of a movement for living rivers, respecting aquatic life and rivers as ecosystems, preventing their pollution, and rediscovering them as a valuable social and recreational resource. An intrinsically valuable activity – joint time in and at rivers and lakes – is combined with an invitation to citizens to reclaim their rivers as a political act, and demand implementation of water laws.

The image of people swimming in rivers is a new one in the modern context. In a bigger historical context, however, the innovation reconnects to the past and to the potential restoration of river-swimming traditions across Europe.¹⁹ This point is proposed *pars pro toto* for the much bigger topic of "reconciling people with their rivers. Reconciliation is an essential element to gain people's support to the big European restoration effort for rivers and wetlands, this huge project being expressed in the European Water Framework Directive".²⁰

IMPLICATIONS FOR RESEARCH AND POLICY

So what are the lessons from the grassroots for innovation towards a circular economy? This final section will first turn to research, and will then conclude with implications for policy. For research on innovation and circular economy there is the basic but important point of not limiting discussions to market provision, despite a powerful discourse that tends to do just that. Such an exclusive focus misses out on further sources of innovation and, just as importantly, on how such different modes, their actors, and their specific resources interact. This point is underlined by a recent survey on water innovation which shows the prevailing focus to be very much on materials, components and equipment in water services, primarily domestic water supply, sanitation and hygiene, and wastewater management, as well as water-related services in the energy, agricultural and industrial sectors (Wehn and Montalvo, 2018: 13). The survey recommends that more attention be paid to water resource management and, thereby, to issues related to ecosystem restoration and remediation and the protection of aquatic ecosystems, rivers, lakes and wetlands, as well as to the associated human-made infrastructure. The examples in the last section suggest that a comprehensive innovation focus that also includes innovations from civil society might be one promising way to fill this gap, contributing ideas for alternative land uses and ways of being in a place.

The focus on land use and practices also reveals another important topic with regard to innovation. Are the water retention measures of People and Water or the decentralised freshwater provisions of IKT 'really' innovative? They do not emerge from a search for novelty and profits, nor do they point to technical novelty. Rather, they emerge as creative social responses to what are perceived as the dominant political and economic tendencies – responses which use new network building and the reframing of issues. Indeed, they might emerge in response to innovations experienced negatively, for example the construction of large dams and the use of fertilisers and pesticides described in the example

¹⁷ Or in the original French: *Rivières Sauvages*, available at www.rivieres-sauvages.fr (accessed 21 February 2019).

¹⁸ European Rivers Network. Available at www.ern.org/en/agriculture/ (accessed 21 February 2019).

¹⁹ An example of this is the tradition of the urban river pools, which is experiencing a renaissance as a new architectural feature in building projects across European cities.

²⁰ Big Jump 2005-2015. Available at www.rivernet.org/bigjump/background.htm (accessed 21 February 2019).

above as having provoked struggles. It is noteworthy to recall that modern innovation language emerged from a religio-political conflict, the Reformation. Protestants did not seek to innovate and create new practices, let alone form a new organisation. Rather, it was they who called Catholics "innovators", claiming that the latter proposed new practices (such as the selling of indulgences) and corrupted the true faith (Godin, 2012). History thus points to a more political, but nonetheless topical, use of innovation that extends beyond new technology. The point is additionally important as the relationship between sustainability goals and circular economy is often not explicitly dealt with in the literature (Geissdoerfer et al., 2017); in particular, the social considerations of equity and inclusion tend to lose out (Kirchherr et al., 2017: 227).

A comprehensive focus on innovation offers rich material on the value categories introduced above. Grassroots innovation puts the spotlight on the intrinsic value of citizens-as-agents claiming a say on the basic issues of their lives. The grassroots cases point to a strand of innovation that emerges in response to mainstream markets and their political economy. Civic participation and politics are aspects of such processes towards circular economy, not something outside of it. They make an essential contribution to circular economy more generally, if technological change and efficiency prove insufficient. There is, however, no grassroots political model. Some innovators actively lobby to affect policymaking and its implementation, for example People and Water's attempt to make the New Water Paradigm a part of Slovak national water management, or the IKT attempt to ensure that funding decisions on water management equally consider decentralised solutions. However, some IKT member groups simply want to be left alone by government, in the same way that many Big Jumps are more focused on education and local celebration than on politics.

As is familiar from innovation studies, grassroots innovation also appeals to instrumental values to make a case for and legitimize their solutions: water quality and quantity, climate adaptation and local cooling, etc. For grassroots innovations with links to nature conservation, the intrinsic value of living rivers, biodiversity, flora and fauna is likewise important. Less evident is the role of relational value, community, and tradition. The politics of innovation are not merely reactions to changes imposed from outside. The examples show creative responses drawing on relational values and alternative cognitive frames that validate local action and community. The language of "New Water Paradigm for the Recovery of the Climate", "area-covering water protection", and "Big Jump" points to creative reconfigurations of problems. More subtly, the examples point to narratives that link creative responses to tradition and to its creative restoration. Integrating narratives in this way challenges innovators to explain how the problem came about, and then create a continuity with the situation before the problem arose. In this way, instead of a mere call for traditional, earlier ways of doing things, a learning process becomes possible.²¹ Taken together, these value aspects point to an important general consideration: moving towards circular economies will not be possible only with technology and efficiency gains – unless we assume that efficiency gains will somehow override rebound effects and that the associated technological changes have no unintended consequences. As this assumption is implausible, grassroots innovations point to important opportunities and practices that can complement and sometimes correct an exclusive focus on technology and efficiency.

None of these points on valuation imply that grassroots innovation for water and circular economy is good tout court. As in innovation more generally, goals and impacts are contested, ambivalent, or have unintended consequences. Relational values are a powerful way of connecting people to land and water, but they can also exclude others. Prefigurative practices offer attractive alternatives to particular types of consumption but their success can cause its own problems (as, for example, in some cities where river swimming turns into unorganised mass events).

For circular economy policy, a focus on grassroots innovation thus does not necessarily introduce 'better' innovation, but it does extend the space of the EU-level discussion of innovation. Supporting such

²¹ For a philosophical discussion of such learning processes see Jaeggi (2018).

options requires its own tools. Business innovation, for example, has a relatively clear telos via the marketing and sale of products, profits thereby made, investor support as a result of expected profit, etc. Structurally, grassroots innovation has no monetary profit and investment motive. Typical manifestations of grassroots activism are networks for exchange of experiences and coordination of some social actions, but they generally leave much space to local context. An emphasis on social learning rather than scaling of products and services is partly an expression of this mode of provision and partly due to economic circumstance. In contrast to market innovation, grassroots innovation has no obvious source of income to 'scale up'. Comprehensive innovation policy for a circular economy could therefore support not only new prototypes and projects, but also could support networks, for example financing coordination activities for peer exchange and learning. Practical knowledge exchange is additionally important as there is typically no such thing as 'simply trying it out' for land- and water-related innovations. Due to dense water and agricultural regulations knowledge requirements are high, as is the likelihood of acting in the grey zone of regulations when exploring alternatives.

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