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Sébastien Boillat [iD][a], Adrian Martin [iD][b], Timothy Adams[a], Desiree Daniel[a], Jorge Llopis [iD][a,c],
Elena Zepharovich[a,c], Christoph Oberlack [iD][a,c], Gabi Sonderegger [iD][a,c], Patrick Bottazzi [iD][a,c],
Esteve Corbera [iD][d], Chinwe Ifejika Speranza [iD][a] and Unai Pascual [iD][e]

[a]Institute of Geography, University of Bern, Bern, Switzerland; [b]School of International Development, University of
East Anglia, Norwich, UK; [c]Centre for Development and Environment, University of Bern, Bern, Switzerland;
[d]Institute of Environmental Science and Technology, Universitat Autònoma de Barcelona (ICTA-UAB), Barcelona,
Spain; Switzerland; [e]Basque Centre for Climate Change, University of the Basque Country, Bilbao, Spain

ABSTRACT
Engaging with normative questions in land system science is a key chal-
lenge. This debate paper highlights the potential of incorporating elements
of environmental justice scholarship into the evolving telecoupling frame-
work that focuses on distant interactions in land systems. We first expose
the reasons why environmental justice matters in understanding tele-
coupled systems, and the relevant approaches suited to mainstream envir-
onmental justice into telecoupled contexts. We then explore which specific
elements of environmental justice need to be incorporated into telecou-
pling research. We focus on 1) the distribution of social-ecological burdens
and benefits across distances, 2) power and justice issues in governing
distantly tied systems, and 3) recognition issues in information flows, fram-
ings and discourses across distances. We conclude our paper highlighting
key mechanisms to address injustices in telecoupled land systems.

Introduction

The expansion of socio-economic globalization has widened the distance between the benefits and
costs of land use change. For example, soybean imports from South America have enabled China to
avoid domestic agricultural expansion and spare land for afforestation (Torres et al., 2017). Global
soybean demand benefits industrial processing companies, importers and governments of import-
ing and exporting countries (Oviedo, 2015). However, it has led to rapid deforestation in the
Argentinian Chaco (Fehlenberg et al., 2017), displacing indigenous peoples and small-scale farmers
(Cáceres, 2015; Leguizamón, 2016), and exposing them to flooding and reduced availability of forest
products (Camino et al., 2018).

This example shows how land use change generates social-ecological impacts across distances and
scales. The concept of telecoupling helps to explore these effects by linking globalization with land use
change (Eakin et al., 2014; Friis et al., 2016; Lenschow et al., 2016; Liu et al., 2013). Telecoupled systems
are distantly connected social-ecological systems sending and receiving goods and services, energy,
matter, information and living species through their enabling agents (Liu et al., 2013). The connected
systems (in the example above, deforested lands in Argentina and spared land in China) can also
directly or indirectly affect additional 'spillover' systems. In our example, these would be the corn and

paddy fields that replaced soybean production areas in the Heilongjiang province of China, resulting in nitrogen pollution (Sun et al., 2018).

The novelty and analytical potential of a telecoupling lens is to reveal such distant ties from a social-ecological perspective, while earlier approaches have focused either on ecological or socio-economic aspects (Liu et al., 2013). Nevertheless, telecoupling studies still need to engage with normative questions in order to deal with the moral consequences of decision-making (Nielsen et al., 2019). This has not happened systematically yet (Corbera et al., 2019). We contend that an environmental justice lens can contribute significantly to critically reflect and operationalize the normative dimensions of telecouplings.

In what follows, we first explain why environmental (in)justices are fundamental features of telecoupled systems. We demonstrate why telecoupled systems produce social and environmental inequalities qualified as unjust, and which approaches of environmental justice are most suited for analysing these situations. Secondly, we explore which elements of environmental justice can and should already be incorporated in telecoupling research. We then highlight possible mechanisms towards achieving greater environmental justice in telecoupled systems.

Why telecoupling research needs to account for environmental justice

Because sending and receiving goods through distance implies a redistribution of the environmental costs of their production, environmental inequality is prominent in telecoupled systems. For example, soybeans are consumed in Europe and China while the environmental burdens concentrate at the producing locations in South America. There is wide empirical evidence that more affluent people and economies can shift the environmental costs of their consumption, such as carbon emissions (Xiong et al., 2018) or deforestation (Jorgenson, 2006) to distant places. In these places, land use changes due to the production of global commodities have strong negative impacts on socio-economically dis-advantaged and disempowered social groups (Borras et al., 2011; Peluso & Lund, 2011).

Hornborg (1998) explains the mechanisms that lead to global environmental inequalities through the theory of ecological unequal exchange (EUE). EUE postulates that though raw materials have a greater productive potential and that their extraction has high environmental impacts, their monetary value is lower than processed goods (Givens et al., 2019). In a connected global system where nations have historically unequal positions (Wallerstein, 1984), centres of consumption concentrate exchange value while they undermine the productive potential that they absorb through trade from their peripheries. This accumulation of exchange value allows centres to further extract raw materials and cheap labour at their periphery (Martinez-Alier, 2009) and shift environmental burdens and social costs onto those who have less access to consumption of goods and services (Fitzgerald & Auerbach, 2016; Rice, 2007). Though the periphery often corresponds to the Global South, unequal exchange and core-periphery dynamics work both within and between nations (Dunaway & Clelland, 2016; W. Zhang et al., 2018).

Why is justice an appealing concept for analysing such unequal social-ecological exchange? Justice is a fundamental evaluative criterion in moral philosophy (Rawls, 1971; Sen, 2009). John Locke (1690/2005) showed that justice has an intrinsic value ensuring people the opportunities for a life worth living, as well as an instrumental value (as a 'social contract' in Locke's terms) because justice is considered to be a condition that enables collective action towards goals such as sustainability (Martin, 2013, p. 99).

Though sustainability and justice are often framed as separate conditions (e.g. Leach et al., 2018), EUE suggests that unsustainable and unjust conditions tend to be causally inter-linked in tele-coupled systems. Empirical evidence shows that more unequal societies tend to have more degraded environments, in particular air and water (Cushing et al., 2015). Inversely, socially just environmental measures and policies are more likely to be effective (Brondizio & Le Tourneau, 2016; Pascual, Phelps et al., 2014). Boyce (2018) explains this link through the power-weighted social decision rule: powerful people, companies and nations are less likely to address environmental costs

when they can shift them to others who lack sufficient economic and political power to take environmentally relevant decisions.

We postulate that environmental justice provides the most developed framing to understand environmental inequalities and their causes in telecoupled systems. Environmental justice has expanded its initial focus on characterizing environmental burdens among disadvantaged groups (Bullard, 1997) to understand the causes of these inequalities as well as justice claims, discourses and practices in environmental issues (Holifield et al., 2009). Schlosberg (2007, 2013) has shown that environmental justice issues and claims work along three dimensions: 1) the distribution of environmental burdens and benefits, 2) procedural justice, the fairness and autonomy of environmental decisions-making and 3) recognition justice including issues of rights, power, and respect for cultural differences in knowing and shaping the environment (Martin, 2013).

This framing is particularly relevant for telecoupling research. Distributive environmental justice can help to identify how telecoupling dynamics create winners and losers. Procedural and recognition justice contribute to integrate responsibility and agency perspectives in telecoupling research. Finally, highlighting mechanisms that improve environmental justice in telecoupled systems can enhance the understanding of feedback processes and their transformative potential.

Despite the relevance of environmental justice issues for telecoupling research, few studies have addressed it explicitly. A recent review of 48 telecoupling studies (Corbera et al., 2019) found only three contributions that integrate justice explicitly, and also found that those studies that do integrate justice implicitly generally concentrate on distributive equity aspects. This suggests that studies on environmental justice and telecoupling have remained largely disconnected in the global land systems and sustainability science literatures, with few exceptions (e.g. Boillat et al., 2018; Lundsgaard-Hansen et al., 2018; Oberlack, Boillat et al., 2018; Schröter et al., 2018; Zimmerer et al., 2018). In the next sections, we discuss each dimension of environmental justice and which related questions and empirical approaches could help enriching the study of telecoupled systems. The table in supplementary material summarizes these questions.

Elements of environmental justice to incorporate into telecoupling research

Distributive justice: benefits and burdens across distances

In telecoupled systems, distributive justice is about the benefits and burdens generated by social-ecological flows across distances. This includes 'embedded' natural resources and emissions in commodities, such as virtual water (Hoekstra & Mekonnen, 2012), land (Yu et al., 2013; J. Zhang et al., 2016), and greenhouse gases (Xiong et al., 2018). Schröter et al. (2018) conceptualize environmental benefits in telecoupled systems as benefits from interregional flows of ecosystem services, including trade of goods, active and passive biophysical flows and information flows. Pascual, Palomo et al. (2017) identify negative impacts through ecosystem service burdens that can be distant but also temporally delayed and spatially diffuse.

The ecosystem services framing is nevertheless limited by its utilitarian conception of nature and justice that cannot be assumed to be shared among the actors involved (Díaz et al., 2018; Sikor, 2014). The IPBES framework of 'nature's contributions to people' (Díaz et al., 2018) and its adaptation to land systems (Ellis et al., 2019) acknowledges the diversity of valuation languages; it highlights the importance of social relations in land systems, the connections between land and multiple dimensions of well-being, and actors' views about these relations. Accounting for this diversity is particularly relevant in telecoupled systems that span across borders and cultures.

We thus propose to examine the distribution of burdens and benefits in telecoupled systems through a diversity of valuation languages. This requires knowledge co-production methods to assess telecouplings (Zaehringer et al., 2019) and the social impacts of ecosystem change from a multi-dimensional perspective (Daw et al., 2011; Dawson & Martin, 2015). Such perspective implies to move beyond social outcomes that strictly arise from ecological change (Lele et al.,

2013) and consider direct social effects of telecouplings, such as changing labour practices in connected systems (Li, 2011), changing terms of trade, entitlements and the control of land and natural resources.

Procedural justice: actors, decision-making spaces, and power

To become operational in terms of justice, burdens and benefits must be linked with actors holding responsibilities and claims. Instead of focusing either on production or consumption-based responsibility, Marques et al. (2012) propose the concept of income-based environmental responsibility (IBER) as an extension of downstream responsibility. IBER considers the suppliers of primary factors of production, including resources, capital and knowledge (e.g. GM seeds developers, financial institutions and large crushing industries in the soybean example) as responsible agents. IBER takes into account whole supply chains and both direct and indirect effects and is in line with the Equator Principles that focus on financial bodies (Marques et al., 2012). This concept or a combination of it with consumption-based responsibility provide a basis to track responsibilities in telecoupled systems.

Procedural justice is about the extent to which legitimate voices and interests of individuals and social groups are represented in decision-making. Inquiring about who is potentially affected by telecoupling processes raises the question of the subjects of justice, namely those considered legitimate holders of claims to social and environmental rights (Sikor, Martin et al., 2014). Rawlsian theory postulates that subjects of justice are the members of a sovereign nation-state. However, this definition falls short in telecoupled systems that typically cross borders (Fraser, 2010a). One should instead refer to the all-subjected principle (Fraser, 2010b) which posits that all people that are affected by governing decisions taken in relation with a telecoupling process or a telecoupled system are subjects of justice.

This leads us to identify decision-making spaces that refer to the set of collectively binding, coordination and steering decisions gathered under the broad concept of governance (Newig et al., 2019). From an institutional analysis perspective (Ostrom, 2005), the social spaces in which actors interact and make decisions are called action situations (Ostrom, 2011). In telecoupled systems, local, distant and flow-centered action situations interact in networks and constitute polycentric governance systems (Oberlack, Boillat et al., 2018). Flow-centered action situations include vertical and horizontal norms, institutions and power relations governing production networks, contract farming, supply chains and the actors who support them (Adams et al., 2018; Gibbon et al., 2008).

We propose that to integrate procedural justice in telecoupling research, one needs to investigate the power balances within and between interacting action situations. Power balance is particularly relevant between responsibilities holders, affected subjects across distant places and accountability bodies which could result from transnational alliances between subjects, advocacy groups and governments (Kumar, 2014). The ability of actors to bridge physical, social or institutional distances could be used as an indicator of power in telecoupled systems (Boillat et al., 2018; Eakin et al., 2017; Kashwan, 2015). As a relational characteristic of actors, this ability is closely linked with recognition justice.

Recognition justice: information flows, framings and discourses

Recognition injustices involve harms linked to discrimination and domination, produced through formal rules (e.g. tenure rules that discriminate against women) as well as informal norms (e.g. prevailing traditional institutions that prevent women controlling land) that disregard some people to make legitimate claims against imposed burdens. Structural inequalities are expressed at multiple scales through institutions, practices, language and symbols, producing problem framings that strongly influence distributive and procedural outcomes (Fraser, 2000; Schlosberg, 2007; Young, 1990).

Global environmental justice literature pays a particular attention to the recognition injustices linked to coloniality (Álvarez & Coolsaet, 2018; Martin et al., 2016; Rodriguez, 2013; Rodríguez & Inturias, 2018). Coloniality postulates that environmental injustices arise because governance spaces are driven by dominant forms of knowledge and values, which in turn shape both problem analysis and solutions in ways that reflect and reproduce colonial power asymmetries and reinforce social distance (De Sousa Santos, 2010). From a telecoupling perspective, these spaces embody and project dominant conceptions of nature in distant places. Though policies often 'recognise' local or indigenous community rights, such safeguards are often undermined by the reproduction of colonial politics of recognition. In mainstream conservation practice, for example, indigenous and local communities must often enter into formal compensation or benefit-sharing schemes, rooted in imposed economistic epistemologies, in order to be taken seriously as conservation agents (Martin et al., 2016).

We thus propose to integrate recognition justice concerns into telecoupling research through an examination of discourses, scale choices, evidence framing, views on nature and views of justice expressed in information flows from a decolonial or more generally critical perspective on dominant values. This focus emphasizes that 'information flows' are rarely if ever innocent of injustice. Information is entangled with issues of 'whose knowledge', 'whose values' and ultimately 'whose justice' is made visible or invisible. Such questions are relevant to everyday practices that are presented as neutral but are in fact deeply political, such as choices over appropriate scales of analysis (Towers, 2000), what subjects of justice are considered (Sikor, Martin et al., 2014), what kind of evidence is admissible, and so on. To enhance recognition justice, our analysis of telecoupled systems should therefore employ a 'thickened' sense of information flows that asks whose knowledge, values and interests are considered, and whose are rendered invisible. This will also require critical reflection on the framing of telecoupling itself. For example, categorizing places as 'sending', 'receiving' or 'spillover' could simplify spatial relations and assumes agency is confined to 'sending' regions (Friis et al., 2016).

Addressing injustices in telecoupled systems

Telecoupling research can build on insights from environmental justice research on selected, potential mechanisms for transforming environmental justices in telecoupled systems.

First, responses to injustices can be driven by social movements that are increasingly interconnected around common values, concerns and interests (Anguelovski & Martínez Alier, 2014; Temper et al., 2018). Through the *boomerang mechanism* (Keck & Sikkink, 1998, pp. 12–13), local activists can purposefully seek transnational allies to draw attention to the existing injustices, mobilize international leverage and eventually reshape power asymmetries (Keck & Sikkink, 1998; Veuthey & Gerber, 2012). These allies can include foreign and international NGOs (Carruthers, 2008; Keck & Sikkink, 1998), financial and trade organizations (Nelson, 2002), courts and tribunals (Spalding, 2017) or company shareholders (McAteer & Pulver, 2009). This mechanism can potentially empower marginalized subjects of justice, defend community rights and resources, reinvigorate local identities and better recognition of local ecological knowledge (Oberlack, Tejada et al., 2016; Villamayor-Tomas & García-López, 2018).

Second, the *catapult mechanism* describes the inverse setting, in which responses are initiated by transnational actors such as international NGOs who form alliances with local actors. They can harmonize their own agenda with local environmental justice struggles (Temper, 2019) and proactively support the agency of local resource users (Lundsgaard-Hansen et al., 2018). Resistance movements can also scale out their effects through the *minefield mechanism*, through which highly conflictive projects can change the overall perception of similar projects (e.g. in terms of risk and profitability), leading to alterations in investment behaviour, legal action, or regulatory changes (Temper, 2019). For example, wide-spread citizen resistance enhanced the open pit mining ban in Costa Rica in 2010 (Broad & Fischer-Mackey, 2017).

Third, different combinations of public, private and third sector actors collaborate to mitigate environmental justice conflicts through *enhanced transparency* (Anseeuw et al., 2013; Gardner et al.,

2019). Better public access to information, including environmental data, can constrain elites to extract resource rents and to form patronage networks (Corrigan, 2014; Dillon et al., 2017). Transparency initiatives may provide new means of participation and accountability in land and resource governance (Mejía Acosta, 2013; Vijge et al., 2019).

More mechanisms to transform injustices in telecoupled systems exist, for instance, through global institutions or states (Lenschow et al., 2016). The presented mechanisms can interact and involve different configurations of agencies, including those of researchers. Telecoupling research has an inherently transformative power by highlighting processes that link distant responsibilities and claims. Telecoupling researchers should thus engage in research co-design and knowledge co-production processes that require self-reflection on their roles in transforming injustices (Pohl et al., 2010; Temper & Del Bene, 2016).

Conclusion

In this article, we have advocated for the inclusion of a justice perspective in telecoupling research. We have shown how social-ecological flows across distances create winners and losers, how to assess them and under which conditions injustices can be reduced. Because telecouplings are social-ecological interactions, some people in some contexts are likely to bear adverse effects in both social and ecological terms while, in other contexts, telecouplings might not necessarily translate into subjectively felt injustices. In this regard, we would refer to the Rawlsian principle that only processes which do achieve better conditions for the worst off can be labelled as just.

Specifically, we have argued for the incorporation of procedural and recognition perspectives in telecoupling research, which pays increased attention to responsibilities, governance systems, power, discourses and values. Such perspective can contribute to a richer understanding of which mechanisms create and reproduce injustices at different scales for different actors in telecoupled systems and contribute to a more engaged and reflexive role of telecoupling researchers in transforming injustices.

ORCID

Sébastien Boillat http://orcid.org/0000-0002-8035-6335
Adrian Martin http://orcid.org/0000-0003-2916-7712
Jorge Llopis http://orcid.org/0000-0002-6605-6539
Christoph Oberlack http://orcid.org/0000-0003-2813-7327
Gabi Sonderegger http://orcid.org/0000-0001-8442-6444
Patrick Bottazzi http://orcid.org/0000-0002-0431-802X
Esteve Corbera http://orcid.org/0000-0001-7970-4411
Chinwe Ifejika Speranza http://orcid.org/0000-0003-1927-7635
Unai Pascual http://orcid.org/0000-0002-5696-236X

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