

The relevance of ecosystem services to land reform policies: Insights from South Africa



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ABSTRACT

Land reform is an important socio-political strategy in many countries. Despite the importance of ecosystem health in attaining land reform objectives, human-nature interactions have been largely absent from contemporary land reform discussions. In this perspectives paper, we highlight why land reform programmes could benefit from considering ecosystem services in their planning processes, to better achieve their goals of socio-economic development and equity. Drawing on examples from South Africa, we argue that an ecosystem services lens can help achieve equity in land reform programmes by providing insight into how land-use legacies and the multi-functional nature of landscapes influence who benefits from land reform across space and through time. An ecosystem services lens also broadens understanding of how fragmentation and a changing climate may affect land reform benefits over time. In ignoring these human-nature interactions, and often unquestioningly applying one-size-fit-all approaches, land-reform policies risk missing the ultimate needs of beneficiaries and broader society. Considering these insights, we discuss practical implications of an ecosystem services lens for land reform programmes. These include the need for context-sensitive, localized land reform planning that accounts for ecosystem service heterogeneity, possible trade-offs, and beneficiaries' preferences and capacities. Accordingly, extension services need to possess local knowledge and avoid generic, top-down and inflexible approaches. These social-ecological considerations are imperative if countries are to achieve sustainable and equitable land reform.

1. Introduction

Land reform is a political and social justice priority in many countries (Akinola and Wissink, 2019; Boyce et al., 2005) that can have far-reaching social-ecological consequences. These range from increased farm productivity and investment (Boyce et al., 2005; Lawry et al., 2017) and ecological restoration (Bryan et al., 2018) to food insecurity (Valente, 2009), violence, and the destruction of natural habitats (Alston et al., 2000). Land reform may be achieved through a diversity of mechanisms. Common mechanisms include restitution (the return of land to previous occupants), redistribution (redistributing land from one stakeholder group, e.g. wealthier owners or the state, to poorer people or a more representative portion of society), and land tenure reform (changing land tenure rules) (Boyce et al., 2005; Lawry et al., 2017). Despite the diversity of contemporary land reform programmes, nearly all have at their heart the goals of socio-economic development,

equity, historical redress, and justice (Akinola and Wissink, 2019; Bryan et al., 2018).

It is increasingly recognized that socio-economic development and equity depend on the global ecological system. People, communities, economies, societies, and cultures are shaped by, dependent on, and evolve with the world's ecosystems (Folke et al., 2016; Rockström et al., 2009). Concurrently, people shape the ecosystems on which they depend, from local to global scales (Folke et al., 2016; Ostrom, 2009a). Interacting systems of people and nature, or 'social-ecological systems' (SES) are complex and adaptive. The behaviour of SES (and thus the outcomes for people and nature) depends on the way in which the social and ecological components interact with each other, and with their context (Preiser et al., 2018). Recognition of the importance of social-ecological interactions for achieving long-term, equitable development has gone beyond just national strategies, exemplified by the United Nations 2030 Agenda for Sustainable Development, with its Sustainable

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Development Goals (SDGs) (Rosa et al., 2017). Applying the concept of SES to land reform means recognizing that the ability of land reform processes to achieve their goals of equity and socio-economic development depends on the social-ecological context in which each land parcel exists. In addition, the actions of people on individual parcels of land can have implications for society more broadly. Consequently, achieving the goals of land reform requires an explicit consideration of social-ecological interactions, and a recognition that these systems change over time and space (Preiser et al., 2018; Rosa et al., 2017).

Incorporating SES thinking into practice can be challenging, since it calls for consideration of the complex relationships between humans and nature across multiple spatial and temporal scales (Sellberg et al., 2018). SES thinking further calls for reflection on the role of institutions and decision-making in mediating these relationships (Ostrom, 2009a). One concept that offers an entry point into applying SES thinking to the process of land reform is ecosystem services – the contributions that ecosystems make to human well-being (Haines-Young and Potschin-Young, 2018). In this perspectives article, we discuss the importance of considering ecosystem services to achieve the land reform goals of sustainable socio-economic development and equity. We first explain how an ecosystem services lens enables a more systemic perspective on land reform. Thereafter, we draw on South Africa as a particularly rich and illustrative case study to discuss how the connections between nature and society, represented by ecosystem services, can shape the outcomes of land reform across space and through time. We address the question “Who benefits from land reform, and how is this influenced by dynamic land-use contexts?” The dynamic contexts we consider include land legacies, current uses, and possible future change such as climate change and fragmentation. Based on the insights from this case study, we outline a series of social-ecological considerations for land reform programmes globally. To our knowledge, this is the first application of SES thinking to land reform. It builds on previous research on the environmental justice dimensions of land reform (Walker, 2008; Wynberg and Sowman, 2007) by more explicitly considering the two-way interactions between people and nature.

2. An ecosystem services lens on land reform

Landscapes provide a suite of benefits to a diverse array of people across multiple scales (DeFries et al., 2004; Díaz et al., 2015; Ellis et al., 2019). In recent decades, the ecosystem services concept has become widely-used for understanding links between people and nature (Costanza et al., 2017; Schröter et al., 2014). As shown in Fig. 1, applying an ecosystem services lens means explicitly acknowledging that land can provide multiple benefits through ecosystem services (green boxes), which contribute to human well-being (blue boxes; Reyers et al., 2013). Many ecosystem service bundles (sets of ecosystem services that occur together frequently under a given land use; Raudsepp-Hearne et al., 2010) are not bounded to a single land parcel, meaning the flow of benefits may reach people outside the boundaries of the land parcel. A change in how the land parcel is managed can therefore present trade-offs, either where provision of an ecosystem service is enhanced at the expense of another ecosystem service (green boxes; Fig. 1), or provision of ecosystem services benefits one beneficiary at the expense of other beneficiaries' well-being (blue boxes; Fig. 1) (Rodríguez et al., 2006). For example, in addition to food provision, agricultural land can provide water infiltration, pollination services, habitats for some species, and contribute to carbon sequestration (Raudsepp-Hearne et al., 2010). In intensive croplands, however, maximising food production may result in decreased water, soil quantity and quality, and pollination services, resulting in a loss of ecosystem services that support (1) agriculture in the long-term, (2) downstream water users, as well as (3) global climate regulation on which all of society depends (Foley et al., 2005).

Changes in human well-being arising from alterations in the types, quality, quantity or timing of ecosystem services, and who has access to

these, can then feedback via societal perceptions and responses to influence governance and policy. Resultant changes can occur at the scale of the individual land parcel, such as altered land use, or at the regional or national scale, such as land reform policies (orange boxes; Fig. 1). Management and governance then interact with social-ecological conditions (e.g. land reform beneficiaries' needs and capabilities, climate, infrastructure; grey boxes; Fig. 1) to modify ecosystem service outcomes. For example, changes to land rights through altered policy can then alter who has rights to access and use the land, and who benefits from the resultant ecosystem services.

Considering the multiple possible beneficiaries of ecosystem services provided by the land necessitates recognition of the diversity of both beneficiary values (Brauman et al., 2007) and ecosystem services (Kull et al., 2015). Access to ecosystem service benefits depends on which beneficiaries have control over land management, as well as the economic and socio-cultural divisions between beneficiaries who may hold contradictory perspectives on which ecosystem services are valued (Brauman et al., 2007). Thus, consideration of power relations between stakeholders is a crucial element of ecosystem service trade-off management and hence land reform planning (Howe et al., 2014). Acknowledging ecosystem service trade-offs, in an inclusive and equitable manner, allows for explicit (rather than unintended) choices to be made with regards to who is affected across space and time (McShane et al., 2011).

While widely used in research, policy and environmental management (Braat et al., 2018; Costanza et al., 2017; Kull et al., 2015), the ecosystem service concept has also invited criticism. Most relevant for this paper is the critique that an ecosystem services lens focuses too narrowly on the instrumental and aggregate value of nature to people, neglecting intrinsic and relational values, which makes it ill-equipped to facilitate social justice (Chan et al., 2012; Chaudhary et al., 2019, 2018; Díaz et al., 2018). This criticism links to concerns that ecosystem service research is over-reliant on economic methods (Lele et al., 2013). Given the strong economic focus of current land reform discourses, however, we argue that ecosystem services are appropriate compared with other conceptualisations of human-nature interaction, such as nature's contributions to people or sustainability (Kenter, 2018). Ecosystem services remain the dominant concept guiding land use and environmental policy (Kull et al., 2015), which is the audience that our paper seeks to engage. Furthermore, the shortcomings of the ecosystem services lens for achieving social justice outcomes are related to programme designs that fail to disaggregate between different types of benefits and beneficiaries, rather than an indictment of the ecosystem service concept itself. Many studies have applied environmental justice and political ecology perspectives to investigate how ecosystem service perception and use may be affected by power imbalances within communities and across governance scales, and how it may differ for different societal groups (Chaudhary et al., 2019, 2018; Cundill et al., 2017; Weyer et al., 2019). Similarly, in this paper we argue that an ecosystem services lens could be used to highlight inequities inherent in current framings of land reform.

To highlight the value that an ecosystem services lens would bring to equitable and sustainable land reform planning, the authors reviewed the literature for papers that discussed ecological health in the context of land reform processes and policy. This literature included studies from Brazil, China, Ecuador, Ghana, Indonesia, Kenya, Namibia, South Africa, and Tanzania (e.g. Akinola and Wissink, 2019; Alston et al., 2000; Bryan et al., 2018; Cundill et al., 2013; Falk et al., 2017; Lawry et al., 2017). From this literature and during an author workshop at Rhodes University in South Africa in November 2018, we identified five key insights that an ecosystem services lens could bring to equitable and sustainable land reform planning. These insights pertain to (1) who benefits from land reform; the (2) legacies and (3) multi-functionality of landscapes that influence who benefits, when, and how; and the consequences of (4) a changing climate and (5) social and ecological fragmentation for these benefits into the future. These

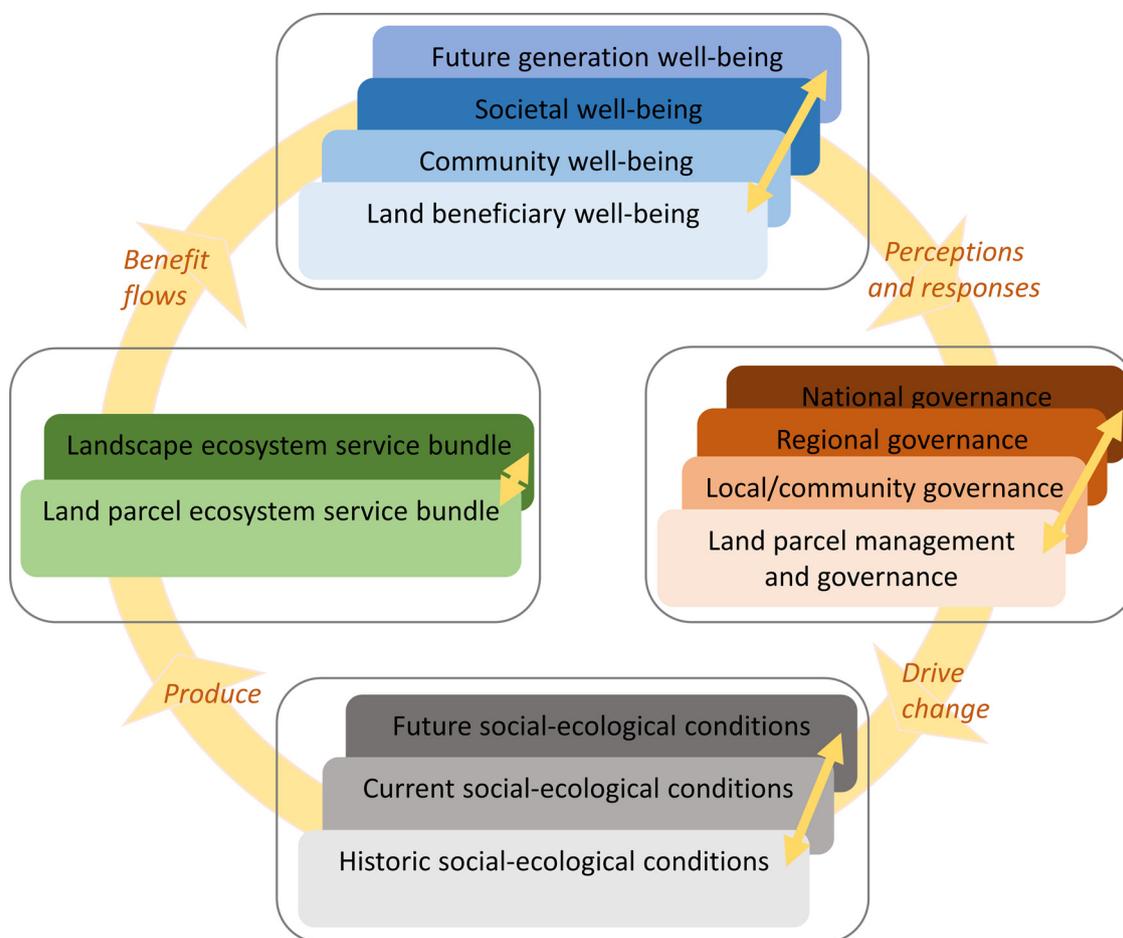


Fig. 1. A social-ecological systems perspective on land reform. Adapted from [Reyers et al. \(2013\)](#).

insights are each considered in the South African context, discussing their implications for land reform policy and processes. The paper does not intend to represent an exhaustive list of possible insights and implications, but rather to demonstrate by way of a case-study example the importance of considering human-nature interactions in land reform debates and outcomes and thereby stimulate further debate and research.

3. The South African case study

South Africa has been grappling with the complexities of transforming land ownership since it became a democracy 25 years ago ([Hall, 2007](#); [Hebinck and Shackleton, 2011](#)). During the previous racially defined and discriminatory apartheid era, land ownership became concentrated in the hands of a white minority, through a series of land acts that prevented land ownership by black people (in South African policy this includes African, Indian and Coloured people) across much of the country ([Hall, 2004](#)). After democracy in 1994, the Restitution of Land Rights Act (1994) and the Land Reform White Paper (1997) were developed to (1) restore land rights to those dispossessed by apartheid through a land restitution programme; (2) secure and upgrade the rights of those with insecure rights to land through a land tenure reform programme; and (3) change the racially skewed land ownership patterns through a land redistribution programme ([DLA, 1997](#); [Hall, 2004](#)). Despite government policy and intentions, land reform to date has yielded little benefit to previously marginalized groups ([Hall, 2004](#)). It is estimated that only around 9% of farmland has been transferred through restitution and redistribution, and many settled restitution claims have not been fully implemented ([Cousins, 2016](#)).

The contributing factors for these limited outcomes range from legal

to economic and political. Although Section 25(5) of the South African constitution establishes that the state must promote conditions that would lead to equitable land access for all citizens, no legal framework has been created to foster this ([Mahlati, 2019](#)). There have been challenges regarding the lack of land available for sale at reasonable prices (coupled with government budgetary constraints); financial and practical obstacles to the poor accessing the programme; limited post-transfer support in the form of extension services; and the continued state privileging of large-scale, capital-intensive uses of agricultural land ([Cousins, 2016](#); [Hall, 2004](#)). The lack of a monitoring and evaluation programme by the government and the absence of a national land-centred vision have also contributed to the limited impact of land reform in South Africa ([Mahlati, 2019](#)).

As a result of these failures, the South African government is currently in the process of reviewing potential accelerated land reform strategies ([Ramaphosa, 2018](#)). The current political debate mobilises 'land' as a symbol of the restoration of citizenship and belonging ([Kepe and Hall, 2018](#)). The state is explicitly prioritising economic development, poverty reduction and the redress of historical and race-based inequitable land distribution ([DLA, 1997](#); [Kepe and Hall, 2018](#); [Ramaphosa, 2018](#)). The goals are thus broadly similar to those of other land reform programmes, particularly in Africa ([Akinola and Wissink, 2019](#)). In addition to these goals, the state is emphasising the importance of maintaining food security and agricultural productivity during the reform process ([Ramaphosa, 2018](#)). The South African government thus has a very specific (and arguably, *narrow*) perspective on the type of ecosystem service that a parcel of land should provide (i.e. food production).

South Africa's President Cyril Ramaphosa appointed an Expert Advisory Panel on Land Reform and Agriculture to examine the

conditions for ‘expropriation without compensation’, as part of its accelerated agricultural, rural and urban land reform (Mahlati, 2019). The report produced by this panel attempts to refocus the country’s land reform debate. It raises some of the issues that we discuss in this article, such as the selection of beneficiaries, women’s access to land, the importance of considering climate change in the land reform process and even an ecosystem-based adaptation process (Mahlati, 2019). Interestingly, the ecosystem services concept is integrated into South Africa’s national development plans and environmental sustainability is also enshrined in the constitution (Act 108 of 1996). The history of land distribution in South Africa and the highly politicised and potentially volatile nature of the land reform debate in the country signify that the trade-offs and the implications of not using an ecosystem services lens are identifiable and illustrative. South Africa is thus an ideal case study to demonstrate the importance of using such a lens.

3.1. Land reform for whom?

Given the common focus of land reform programmes around the world on equity and justice, it is important to have clarity on what these goals mean, and who they include. South Africa’s land reform white paper puts equity at the centre of the debate, emphasizing the need to redress the injustices of the past, foster reconciliation and stability, as well as alleviate poverty (DLA, 1997). What the white paper does not do, however, is to define what it means by equity, and neither does the Land Restitution Act (1994). Whereas justice brings to the land debate the idea that all people are equal, equity refers to the inherent differences between people, focusing not on what is ‘fair’, but what is a ‘fair share’ (McDermott et al., 2013).

Although ‘marginalised groups’ (women, farm workers, urban and city dwellers, the disabled and the youth) are identified as priority beneficiaries for South African land reform (DLA, 1997), there are no guidelines to target these groups (Mahlati, 2019). The consequences of land reform on gender equity have been varied around the world, though focus has primarily been on the consequences of reform for women’s access to land and land rights (Akinola and Wissink, 2019; Boyce et al., 2005). Men and women can also differ in their access to, use of, and value placed on ecosystem services on a land parcel, influenced by, for example, cultural norms, educational background and socio-economic status (Yang et al., 2018) (Fig. 2, boxes 2 and 3). The focus of South African land reform efforts on full-time farming activities, which are not an option for most women, is believed to be responsible for women representing less than a quarter of the total beneficiaries of land reform in South Africa to-date (Mahlati, 2019).

Furthermore, in addressing inequity, the South African land reform debate focuses primarily on the land beneficiaries (i.e. people who receive land through reform programmes) (DLA, 1997) (Fig. 2, box 1). By focusing on the immediate beneficiaries, the debate portrays the land as static and somewhat independent from its potential to produce ecosystem services, social and environmental contexts, broader society, and future generations (Wynberg and Sowman, 2007). As local biophysical context and land-use legacy defines the current ecosystem services bundle available on a parcel of land (see section 3.2; Fig. 2, boxes 2 and 3), how land is managed and used now will determine the ecosystem services available for future generations and the possible livelihood strategies that these future inhabitants of the land could establish (Bennett et al., 2009).

An ecosystem services lens thus enables a consideration of the extent to which land reform processes address inequities that go beyond just who has access to land. It makes explicit the possibility of trade-offs in addressing inequities between land beneficiaries and broader society, between land beneficiaries now and in future generations, between different types of land beneficiaries and between different types of ecosystem services that the land is most capable of producing.

3.2. Environmental and social legacies influence land reform benefits

Many contemporary land reform programmes focus on the distributive aspect of equity – the need to address the injustices of the past in terms of land ownership. In South Africa, the success of land reform processes is thus often measured simply by the number of land parcels or hectares redistributed or restituted or the number of beneficiaries (Akinola and Wissink, 2019). However, equity goes beyond its distributive dimension (McDermott et al., 2013). As parcels of land provide different bundles of ecosystem services based on their ecological, social, political and economic history (DeFries et al., 2004; Raudsepp-Hearne et al., 2010) (Fig. 2, box 3), beneficiaries will not have the same starting point in terms of what the land can offer. Although beneficiaries might receive the same extent of land, which would suggest an equitable outcome, the ecosystem services offered by the land might prescribe very different livelihood strategies, which could lead to an inequitable outcome. For example, agricultural production remains the focus of existing land reform planning, yet previous management may have degraded the land’s capacity to support sustainable agriculture (Falk et al., 2017). Furthermore, the South African government has proposed focussing land redistribution on ‘unused’ parcels of land (Ramaphosa, 2018), but this land may be unused due to low provision of key ecosystem services, or that they have been degraded (Shackleton et al., 2019). Consideration of local-scale environmental legacies is thus imperative to securing sustainable livelihoods and social justice through land reform.

Social legacies can be equally important in influencing land reform benefits. For many displaced communities, their land provided identity and social cohesion (Cundill et al., 2017; Mahlati, 2019) (Fig. 2, boxes 1 and 2). These benefits are inherently relational (i.e. determined by people’s relationships with nature and the responsibility towards people and nature which derive from these relationships; Chan et al., 2016). They can therefore only be obtained through land restitution. South Africa has performed poorly with regards to land restitution due to a range of challenges including limited budgets and inefficient, bureaucratic processes (Hall, 2004). In addition, when the claimed land falls within protected areas, restitution is generally prevented. These areas are intended to protect the environment for the benefit of present and future generations nationally, contributing to societal justice (Walker, 2008). Claimants cannot return to their land if it is now part of a formally declared protected area, though they can negotiate an ‘equitable sharing of benefits’ from the protected area, which have typically been financial and thus, focused on tangible benefits (Cundill et al., 2017; Kepe et al., 2005). An ecosystem services lens allows the more intangible benefits of land, arising from social legacies, to be incorporated into negotiations with communities (Cundill et al., 2017), progressing beyond the narrow interpretations by the state of the benefits desired by communities. Other benefits include access to spiritual or grave sites, cultural ceremonies, and harvesting of cultural resources. In thinking about social legacies, as Cundill et al. (2017) show, it is important to not only factor in losses of services that might be of instrumental use, but also account for changes and losses in relational values.

3.3. Multiple ecosystem services underpin multiple land-use possibilities

Within the context of promoting equity and social justice, many land reform programmes around the world focus on making land available for farming, other than in urban settings where it is more for residential purposes (Akinola and Wissink, 2019; Boyce et al., 2005; Bryan et al., 2018). The models of farming envisaged vary from subsistence primarily for household food security, and small-scale farms that simultaneously meet household consumptive needs and sell surplus produce on the market, through to commercial agriculture producing for local, national or international markets. The value of land is overwhelmingly viewed in terms of its ability to produce food or other cash crops. Yet, this may not necessarily fit the aspirations of many of the

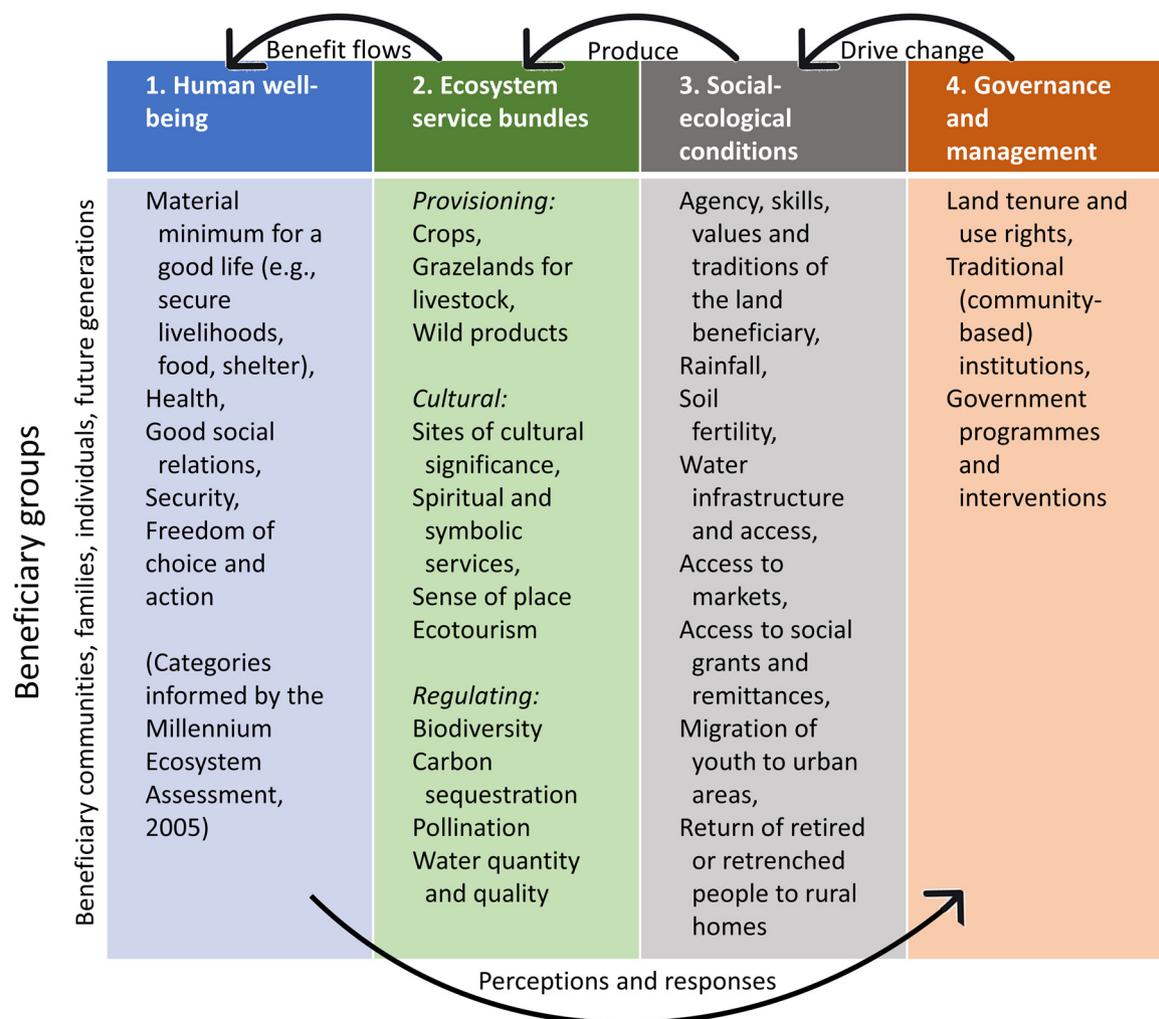


Fig. 2. Application of a social-ecological perspective on land reform, demonstrating the possible changes in ecosystem service bundles received by different societal groups as a result of land reform. (Adapted from [Reyers et al., 2013](#) human well being categories informed by the [Millenium Ecosystem Assessment, 2005](#)).

land beneficiaries, or match the capabilities of the land being redistributed ([Hebinck et al., 2018](#); [Hebinck and Shackleton, 2011](#)) (Fig. 2, boxes 2 and 3). Furthermore, beneficiaries may not have the capital and/or experience to run a farm, requiring additional training to foster farm sustainability ([Hebinck et al., 2018](#)).

In South Africa, some land reform beneficiaries have adopted land uses other than the originally expected agricultural land use ([Hebinck and Cousins, 2013](#)), and these deviations from the land use prescribed by land reform programmes are often the reason for non-disbursement of grant funding ([Hall, 2007](#)). While failed farming attempts may be due to the lack of governmental or institutional support, they are also in part due to failure by the state to recognize and support other livelihood options preferred by the claimants ([Hall, 2007](#)). For example, land parcels with low agricultural potential or high aesthetic services may favour eco- and cultural tourism over farming ([Jansen et al., 1992](#); [Mokotjomela and Nombewu, 2019](#)).

As another example, land recipients in northern KwaZulu-Natal, South Africa, put aside the proposed plan that they develop a self-sustaining agri-village on the land provided to them. Instead, they constructed a dense settlement with built-on rooms, which they let out to people working in the nearby town of Richards Bay ([Van Leynseele and Hebinck, 2011](#)). Finally, land parcels in areas with high production of ecosystem services important to wider society (such as water, carbon sequestration or biodiversity) may opt into payment for ecosystem services (PES) contracts and forego intensive farming. While we are not aware of any cases where land claimants have been involved in PES

schemes, lessons can be learned from examples such as the government-funded Working for Water programme in South Africa, which clears mountain catchments and riparian zones of invasive alien plants to improve water flow ([Turpie et al., 2008](#)), and the Scolel Te carbon forestry project in Mexico, which supports farmers to mitigate forest loss through tree planting and agroforestry ([Pascual et al., 2014](#)). These examples demonstrate the importance of land reform programmes broadening their perceptions on ‘productive’ uses of restituted land, to accommodate diversity in both the characteristics of individual land parcels, and the preferences and capabilities of the beneficiaries of these parcels.

Applying an ecosystem services lens promotes appreciation that land use, and hence land reform, is more than just about conventional farming for food production. Most landscapes provide multiple ecosystem services and consequently are multifunctional, even if land users ultimately focus on a particular subset of available benefits ([Bennett et al., 2009](#); [Raudsepp-Hearne et al., 2010](#)). South Africa’s Presidential Panel on Land Reform goes as far as to argue that there is a competition between different land functions ([Mahlali, 2019](#)). Ecosystem services are co-produced by people and nature ([Haines-Young and Potschin-Young, 2018](#)), conceptualized through their use value and realised through ecosystem functions and ecosystem service potentials. Human preferences and capacities therefore determine the contributions received from ecosystem services ([Spangenberg et al., 2014](#)). Rural livelihoods are typically diverse, drawing on multiple capabilities of household members and the available opportunities ([Neves and du Toit,](#)

2013). Aside from farming, ecosystem services commonly important to rural livelihoods in South Africa include sense of place and identity, a sense of security, collection of many different consumptive or culturally important wild resources, and use of these as a safety net in adverse times (Cundill et al., 2017; Hebinck et al., 2018) (Fig. 2, boxes 1 and 2). Some land reform beneficiaries may thus seek to concentrate on one or more of these rather than farming, or alongside farming.

3.4. Land reform goals need to acknowledge climate change

There is little mention of climate change in land reform discourses around the world, despite the marked effect it is likely to have on achieving long-term land reform goals. South Africa's Presidential Panel on Land Reform highlights this missing link (Mahlati, 2019). Climate change will have variable and noticeable effects in most areas of the world, with stark projections for southern Africa, where large areas are expected to become warmer and drier (Maure et al., 2018). Best estimates indicate that there will be substantial changes in the nature and distribution of biomes and species (Midgley et al., 2002), and hence the supply of ecosystem services (Fig. 2, boxes 2 and 3). Some farmers are already noticing changes and are seeking ways to adapt, but that depends on their ability to do so (Shackleton et al., 2015). The interplay of the changes in temperature and rainfall timing and quantity will vastly alter the supply of numerous provisioning services, with perhaps the most important being food supply. Overall, food insecurity is expected to increase in the region (Dube et al., 2013). Although less studied, regulating services will also be affected. For example, climate change is, among other factors, implicated in global declines of wild pollinators and changes in abundance in some areas (IPBES, 2016; Potts et al., 2010). This will result in reduced reproduction of insect-pollinated crops and fruits, but also wild plant species important for other organisms or valued by rural communities. The nature, frequency and intensity of ecosystem disservices, such as pests, diseases and the spread of invasive species will also change.

These dynamics need to be acknowledged with the realisation that land potential, uses and practices into the future cannot follow a 'business as usual' approach. This realisation is crucial for land reform initiatives because the quality and quantity of ecosystem services available from particular parcels of land are going to change, as will the nature and frequency of ecosystem disservices. Consequently, the location of land reform projects needs to be carefully considered, not only against current social-ecological conditions and potentials (Fig. 2, box 3), but against future ones. It also means that particular ways of using the land or farming practices will need to change in most areas and socially just, adaptive capacity fostered (Shackleton et al., 2015). Failure to acknowledge the realities of climate change and what that means for the supply of ecosystem services in particular locations will compromise the equity, food security and sustainable livelihoods mandates of land reform in the future.

3.5. Social and environmental fragmentation influence land reform outcomes

Land reform processes often require that large tracts of land are divided into smaller tracts, and distributed among more people, potentially impacting the spatial composition of affected ecological communities and hence ecosystem services. Whilst the fragmentation of agricultural services as a result of such land fragmentation is sometimes discussed (Ciaian et al., 2018), the broader social and ecological consequences of land transformation have largely been neglected in the political discourse. An ecosystem services lens explicitly acknowledges that fragmentation is also linked to changes in the human-environment relationship. Land fragmentation potentially severs relational values of communities with their landscapes (Cundill et al., 2017), and may create social tensions between old and new owners, disrupt kinship practices and/or promote tenure insecurities (Andersson Djurfeldt,

2020; Sabates-Wheeler, 2002). Evidence from Europe and elsewhere in Africa has shown that these outcomes may deter long-term investment into, and planning for restituted land, and when it undermines descent and/or inheritance patterns of land ownership, may be met with strong resistance (*ibid.*): "restitution for some [may now] mean deprivation for others" (Sabates-Wheeler, 2002:1008). Thus, land reform can fragment community and individual identity through changing land-use behaviour and disrupting the social institutions that grant access to the ecosystem goods and flows the land provides. These relational ties strongly influence the success of sustainable landscape management interventions (Alexander et al., 2017).

Land fragmentation also has an ecological dimension. The consequences of often-uncoordinated decisions made by individual land users at the scale of land parcels may have implications for broader societal ecosystem services by impacting on larger-scale ecological processes, such as the water cycle, or energy flow (Shackleton and Shackleton, 2015). Ecosystem services operate at scales beyond the (ecologically-)artificial administrative and political units (Cumming et al., 2013; López-Hoffman et al., 2010) that guide land reform processes in practice, e.g. cadastral boundaries. These cross-scale impacts imply that land-use fragmentation is not only a rural consideration: many urban dwellers are dependent on ecosystem services provided by rural landscapes, such as water and food (Fig. 2, boxes 2 and 3) (Shackleton and Shackleton, 2015). Furthermore, many urban dwellers have their identity tied to rural land that they own (Shackleton and Shackleton, 2015). Thus, owing to connections of goods and benefits beyond sites of land reform, the fragmentation of the rural landscape will likely transfer effects to these urban dwellers.

Certainly, the (unintended) consequences of redressing property rights post reform may be the further fragmentation of land ownership and land use (Ciaian et al., 2018), with implications for ecosystem processes and the services they deliver for human well-being. While land fragmentation may have negative consequences for broader society, the division of land parcels between many different land users may, on the other hand, also have positive outcomes for landscape and social resilience by enhancing its multifunctionality (Spangenberg et al., 2014).

3.6. Case study summary

As depicted in Fig. 2, in this section we have highlighted that the multi-dimensional well-being of individuals on a piece of land is not only linked to benefit flows from food production or income; it can also be linked to benefit flows from other (e.g. cultural) ecosystem services provided by a parcel of land. Enabling the provision of such services through land reform can influence the ecosystem services provided by the land to broader society, depending how the land parcel is managed. The diverse ecosystem services that contribute to the well-being of different societal groups are co-produced by social-ecological conditions. Social conditions include the proximity to markets, cultural norms and the skills, agency, needs, preferences and access of land beneficiaries, as well as gender and power dynamics within and among households. The biophysical conditions can include soil type and condition, climatic conditions, and biodiversity. These conditions collectively influence how the land is managed and are not static. They are influenced by social-ecological legacies and may be influenced in the future by climate change or land fragmentation that arises from land reform policies, with important consequences for ecosystem service provision. Reform in land tenure and use rights can thus influence the well-being of different societal groups in different ways, depending on the social-ecological context and resultant ecosystem services bundles.

4. Discussion: Emergent social-ecological considerations for land reform planning

Using South Africa as an example, we have argued that land reform

programmes are unlikely to optimally achieve their goals of socio-economic development and equity if they do not account for the numerous and varied interconnections between land, nature and people (Fig. 1). These insights have important implications for how land reform policy and processes can include ecosystem services, and a social-ecological perspective, to achieve land reform goals that are sustainable and take into consideration all beneficiaries (current and future, near and far) of the land's contributions (Fig. 2).

Firstly, the ecosystem services lens provides insight into the multiple ways in which people benefit from land, beyond the common focus on food production (Akinola and Wissink, 2019) (Fig. 2, boxes 1 and 2). The implication of this is that land reform planning and implementation needs to consider land options more holistically, focusing also on the less tangible benefits that people derive from access to land, such as sense of place, as well as the diverse livelihood options that may be available, dependent on the characteristics of the land and the desires and capabilities of its beneficiaries (Fig. 2, boxes 2 and 3). Consequently, to meet diverse livelihood needs, land reform programmes must be diverse and adaptable in offerings and land-use options and informed by beneficiary aspirations and skills (Fig. 2, boxes 3 and 4).

All land is not the same: different parcels provide unique bundles of ecosystem services, dependent on where they are located and how they have been historically managed, with restoration potentially necessary on some parcels (Fig. 2, boxes 2 and 3). Planning for land reform therefore needs to be context sensitive and localized, accounting for landscape and ecosystem service heterogeneity (Bateman et al., 2013). Approaches that are relevant in one region or country may not be relevant elsewhere. Polycentric governance is a useful approach to incorporating localised, context-specific decision-making, involving multiple governing authorities operating at differing scales (Ostrom, 2009b). Each governance unit has independence within a specified geographic area and domain of authority and may link with others horizontally on common issues and be nested within broader governance units vertically. One of the key principles of polycentricity is to match governance levels to the scale of the problem or opportunity – avoiding centralized decision-making that lacks adaptability and understanding of local problems, whilst maintaining resilience through broader levels of governance that can step in if lower levels fail (Cumming et al., 2006). Devolving land reform planning to local or regional authorities could enable improved consideration of local contexts in decision-making, provided that these authorities have sufficient resources to enact such agency (Fig. 2, box 4).

The ecosystem services lens enables the identification of possible trade-offs between beneficiaries of land reform and society more generally. In South Africa the national government is trying to manage this trade-off by emphasizing that land reform must not impede national food security and economic development (Ramaphosa, 2018), but these are not the only trade-offs. There are trade-offs between managing the land for different bundles of ecosystem services (Raudsepp-Hearne et al., 2010), as well as between current and future generations (Fig. 2) (Mahlati, 2019). Understanding the ecosystem service potentials of land and the trade-offs associated with managing the land for a specific bundle of services would facilitate land-use decision-making, as well as identifying and managing conflicts that may arise between individual agency and societal needs and benefits (Bateman et al., 2013).

Policy makers and planners need to recognize that land is not a static entity, its characteristics and benefit flows will evolve in line with people's preferences and capacity to adapt to changing contexts (e.g. climate change, fragmentation, market prices) (Fig. 2, box 3). It is important to view land as multi-functional landscapes, rather than as individual parcels, acknowledging that management of one parcel influences the broader landscape and ecosystem services provided across space and time. Planners need to anticipate these emergent and likely diverse land-use arrangements and livelihood choices that give rise to multifunctional landscapes, and consider their consequences for critical societal ecosystem services, such as water provision (Nel et al., 2017).

Planning for ecosystem services will also mitigate against potential negative outcomes, such as avoiding unsustainable land management practices. If focused on adaptation, such planning can also secure the ecosystem services needed for future generations and land-claim settlements (Mahlati, 2019).

Finally, land reform necessitates multi-dimensional reform, including resource access and use reform, as well as reform of the institutions that support this process (Fig. 2, box 4). Success cannot simply be measured in terms of area of land redistributed or the number of direct beneficiaries. Monitoring and evaluation programmes on the impact of land reform on livelihoods are also imperative (Mahlati, 2019). An overarching land reform policy framework as well as coherence between land policies and sectoral policies, such as climate change and biodiversity conservation, are necessary (Mahlati, 2019). This includes post-settlement support. Government support structures for landowners ("extension services") and funding models need to extend beyond just agricultural support and consider livelihoods and the range of options for securing them, the nature of support needed and the capacity of the people providing the support. A review of South Africa's extension services to smallholder farmers found "a growing, even exponential mismatch between land acquisition targets and available capacity to support people once they have acquired land" (Williams et al., 2008:16). Extension service reform needs "people-centered innovation and learning" approaches (Williams et al., 2008:23), which support multi-functional livelihoods and land-use systems over long time frames. Extension officers need to possess local knowledge and avoid generic, top-down and relatively inflexible approaches (Williams et al., 2008). Landscapes and people change, and support services need to be responsive to such change.

As land reform processes play out in South Africa and elsewhere, we encourage studies on how beneficiaries have chosen to use the land, and why. There is a need to understand the impacts of land reform beyond hectares transferred, to livelihoods and well-being, especially over the longer term. Combined with advances in the modelling of certain ecosystem services (e.g. water quality regulation, coastal risk reduction, and crop pollination; Chaplin-Kramer et al., 2019), such research could begin to explore benefit flows and trade-offs associated with land reform. Such modelling approaches could also be used to explore the outcomes of possible land reform scenarios (Sitas et al., 2019), to aid in planning.

In exploring possible outcomes for different people, we caution that an ecosystem services lens, like other concepts that link human-environmental interactions (Kenter, 2018), is a social construct that can and has been used to push different political agendas (Kull et al., 2015). Thus, the ecosystem service concept does not operate outside of the realms of power and social inequalities (Kull et al., 2015), and does not represent a silver bullet for engaging with land reform issues. Indeed, different frameworks of human-nature connectedness can be useful in engaging on societal issues in different contexts (Peterson et al., 2018). Whilst an ecosystem services lens is a useful boundary object for engaging with policy in socio-political spheres (such as in the South African case study), other framings of human-nature connectedness that forefront pluralistic values more explicitly (Kenter, 2018) may be needed to develop a deeper understanding of outcomes of land reform for relational values, and in engaging with different stakeholders to the ones this paper is primarily focused on.

5. Conclusions

For land reform to enable sustainable socio-economic development, reduce poverty and promote equity and justice, policies and programmes need to recognize that people and nature are intricately linked. Using the case study of South Africa, we have argued that an ecosystem services lens enables consideration of the multiple dimensions of human-nature interactions across space and time, and thus for more nuanced land reform strategies. Land beneficiaries vary in their

agency and objectives regarding land use, and land management decisions have consequences for ecosystem service provision at broader scales, including for the well-being of society and future generations. An ecosystem services lens also broadens understanding of how fragmentation and a changing climate may affect land reform benefits over time. In ignoring these dimensions, and often unquestioningly applying one-size-fit-all approaches, land-use policies risk missing the ultimate needs of beneficiaries and broader society.

We distil these insights into key implications for land reform programmes. Notably, land reform plans need to be context-sensitive and localized to account for ecosystem service heterogeneity across different land parcels, possible trade-offs between benefits to different land beneficiaries and to broader society, as well as people's needs, preferences and capacities. Extension services need to possess local knowledge and avoid generic, top-down and inflexible approaches. These social-ecological considerations are imperative if countries such as South Africa are to achieve sustainable and equitable land reform.

Credit author statement

All authors contributed to paper conceptualization and writing. HC and ADV led the writing process, CS provided workshop funding.

Declarations of Competing Interest

None.

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Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.landusepol.2020.104939>.

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