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# Achieving Win–Win Solutions in Telecoupled Human–Land Systems

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**Abstract:** Telecoupling refers to socioeconomic and environmental interactions between distant places. Telecoupling is becoming even more significant in the increasingly globalized world and it plays a key role in the emergence of major global environmental problems. In particular, it contributes to land degradation and the achievement of the United Nations' Sustainable Development Goals (SDGs). However, there is a lack of systematic examination of the impacts of telecoupling on land system change, and how to respond to the undesirable impacts. Based on CiteSpace Software, here we analyze the current research status of telecoupled human–land systems, including publications, major scientific research institutions, and research processes. We explore the impacts of telecoupling on land and how to respond to these impacts. Finally, we propose a framework that is composed of impact identification, system integration, and responses to achieve a win-win situation in telecoupled human–land systems. The framework can help to create a sustainable future for telecoupled human–land systems.

**Keywords:** telecoupling; human–natural system; system integration; sustainable development goals

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## 1. Introduction

With the rapid growth of international trade, there are few regions in the world where the environment and natural resources are not affected by human activities initiated in other parts of the world in some way [1]. In particular, increasing frequency and complexity of interactions bring connected regions and countries even closer in the 21st century. Economic globalization is driving environmental change, resulting in a broad range of impacts on society. Interactions between socioeconomic and environmental processes over long distances are embodied in the term telecoupling [2]. International trade, foreign investment, transnational land ownership transfer, species invasion, transfer of knowledge and technology, tourism, and payment for ecosystem services can all be considered as components of telecoupling [2]. Nevertheless, the impact of telecoupling on the human–land system has not been well expounded in the existing literature. The aim of this study, therefore, is to identify and integrate the impacts of telecoupling on land and consider how to respond to undesirable impacts towards achieving sustainable development goals (SDGs). Understanding the role of telecoupling in relation to land is important in addressing major global issues such as climate change, species invasion, biodiversity conservation, resource depletion, and land degradation.

Remote environment and socioeconomic interactions emerged when modern humans evolved [2]. The concept of telecoupling was first proposed in 2008 [3] by synthesizing concepts of teleconnection (interactions between distant climatic systems) [4], globalization (interactions between distant human systems) [5], and coupled human and natural systems [6], referring to socioeconomic and environmental interactions over long distances and relating to distant exchanges of information, energy, and materials at multiple space and time scales [2]. Previously, a coupled human–nature system was regarded as a closed system [7,8]. With rapid socioeconomic development, the interaction between the environment and human society has become even more significant. Nowadays, the coupled human–nature system is recognized as an open system linked by regional flows in the telecoupled world[9]. Liu et al. [2] first proposed the telecoupling framework that is made up of five fundamental interconnected constituents: systems including sending, receiving, and spillover systems; flows of material, information, and energy within the coupled systems; agents that promote the flows; causes that contribute to the flows; and effects that come from the various flows [2,9]. Although telecoupling is a relatively new concept, with the increasing prevalence of, for example, transnational land transactions, alien invasive species, and technology transfer [10], it is attracting wide attention [11,12]. While a conventional approach facilitates the analysis of the dynamic evolution of single human–natural systems in regions, the telecoupling concept enables us to explore the causal linkages between two or more systems across time, geography, and institutions from a multi-scale perspective. However, while the existing literature applies the telecoupling framework to the analysis of a range of telecoupled phenomena [9,13,14], less attention has been paid to the typologies of the impacts on the human–land system and how to deal with these complex impacts.

Telecoupling among different regions can help alleviate food shortages, displace environmental pressure, reduce poverty, improve mobility, encourage migration, increase income, and contribute to regional development, thus creating sustainable developments of the coupled human–nature systems [15,16]. In 2015, the United Nations (UN) introduced the sustainable development goals (SDGs) aimed at addressing social, economic, and environmental problems in an integrated way. The SDGs cover both human well-being (e.g., zero poverty) and environmental sustainability (e.g., climate action and life on land) [17,18]. The 17 SDGs are inextricably linked to each other [19], and global sustainability depends on the complex and multi-scale interactions between humans and the environment [20–22]. To achieve the SDGs, an understanding of the coupling between human and natural systems [23] and the framework of trans-space interrelationship are really needed [20]. Telecoupling ties the human social system and natural environmental system together and acknowledges that complex and profound socioeconomic and environmental local impacts may emerge from remote processes, a concept that is important in helping us to accomplish the SDGs [24]. Given that the human–land system is central to human–natural systems in general, the telecoupling framework provides a useful tool in achieving sustainability [25] and considers global connections as flows among sending, receiving, and spillover systems phenomena [9,13,14]. It also offers a systemic approach to identifying the flows, agents, causes, and influences of systems related to humans and the environment, which could assist in facing the challenges threatening the achievement of the SDGs [18].

Through a comprehensive literature review, this paper aims to explore the influence of telecoupling on land and to reveal how this concept may improve the prospects of achieving sustainable development. We attempt, in respect of land, to elucidate the impacts of telecoupling using data in CiteSpace and Web of Science, and go on to consider how to develop win–win solutions. In so doing, we highlight the need for a more fundamental understanding of the root causes of major global issues, in particular land degradation.

## 2. Methodology

### *2.1. Data Source*

The data in this study are derived mainly from the Web of Science, which is one of the world's most trusted publisher-independent global citation databases and is widely applied in literature analysis [26]. As telecoupling is a relatively new concept, we have searched publications from between 2010 and 2020 with the terms telecoupling (theme), or land use (title), or climate (title). Initially, we obtained 119,559 documents and then set filter conditions to identify highly-cited articles (hot papers) in these research fields, resulting in an analysis of 1727 articles in the Web of Science Core Collection.

### *2.2. CiteSpace*

CiteSpace is an information visualization analysis software and has become regarded as a popular tool in literature reviews [27] as it removes duplicates and improves the accuracy of document analysis. In general, we acquired the basic situation of a particular research field via author/institution/references analysis. Based on the analysis of keywords, we further explored the development process of a science-specific field across the period 2010 to 2020.

### *2.3. Analysis*

One of the most significant advantages of CiteSpace is its visualization function, which assists in interpreting the results. First, we utilized the authors, institutions, and keywords to obtain an overview of existing literature about land in the telecoupled world. Then, we deeply analyzed the impacts and responses about land in the telecoupling world within the themes obtained from the results based on CiteSpace to explore how to achieve win–win situations in the telecoupled human–natural systems, especially in the land–human system. In general, each theme in CiteSpace yielded many related papers but it is possible to summarize several research themes over the study period. Only the documents under the theme "impacts and response" were analyzed to achieve an understanding of the telecoupled human–land system.

## 3. Results

### *3.1. Overview of Results based on CiteSpace*

From Figure 1a it can be seen that from 2010 to 2020, publications about land in the telecoupled world remained consistently high (2020 is an exception as not all for that year were available at the time of the analysis). It is noteworthy that 2013 was the year with the largest number, at least in part due to the fact that that the telecoupling framework was first proposed in that year. There are many institutions studying telecoupled land–human–climate systems, among which the US National Oceanic Atmospheric Administration (NOAA), the Chinese Academy of Sciences, and the US National Center for Atmospheric Research (NCAR) are the most influential organizations (Figure 1b). The development of research on land in the telecoupled world can be seen in Figure 1c. Between 2010 and 2020, the main research direction around land use and telecoupling changed gradually as follows: climate change, urbanization, and their impacts on land were the most prominent topics in 2012, while from 2013 the focus shifted to climate change mitigation with an increasing concern for the telecoupled relationships among human–climate–land systems. Between 2014 and 2017, researchers paid most attention to extreme climate events, $CO_2$ emissions, transformation, and the impacts of land on ecosystem services. From 2018 to 2020 scholars appear to have become more concerned with future changes, global environmental change, and cooperation in global governance (including the Paris Agreement).

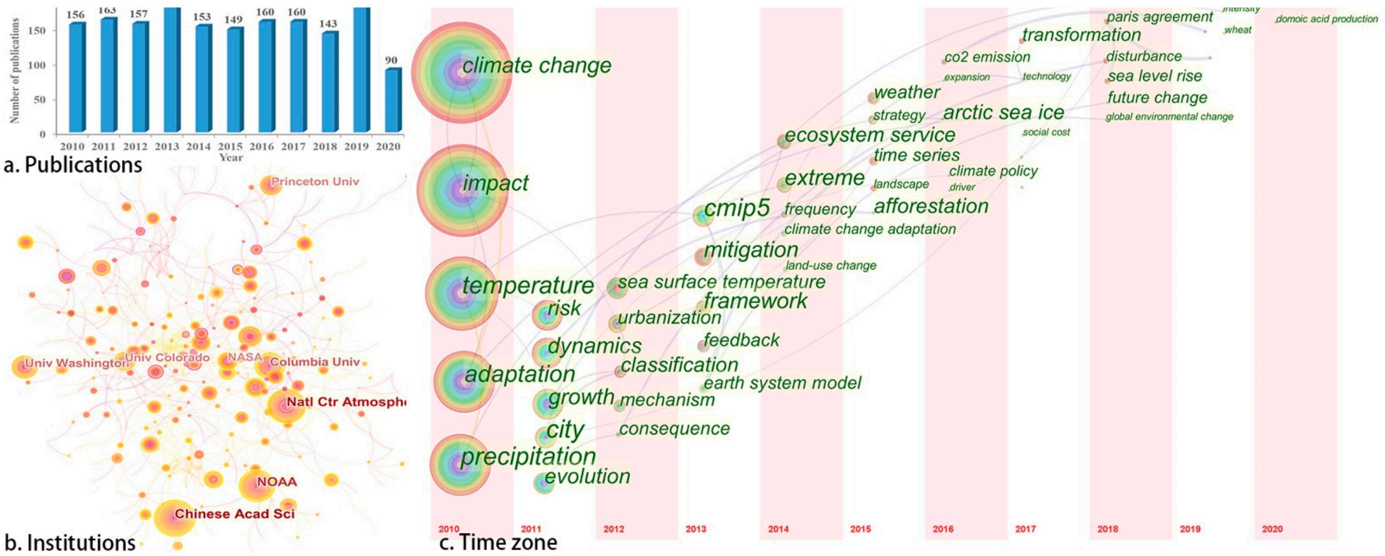


**Figure 1.** Overview of land research in the telecoupled world from 2010 to 2020: (**a**) publications, (**b**) institutions, (**c**) time zone.

### *3.2. Impacts of Telecoupling on Land*

Telecoupling can be seen to have both negative and positive environmental and socioeconomic impacts. As land use is one of the dominant manifestations in the telecoupled human–natural systems, here we take land use as an example to examine the influence of telecoupling on land. Examining the impacts of telecoupling can support decision-making for SDGs, and leverage its positive impacts, and help to maintain land development within a safe operating space [28].

#### 3.2.1. Impacts of Telecoupling on Land Expansion

Telecoupling can strengthen global socioeconomic links via the flow of materials, energy, information, technology, and capital between richer and poorer areas (the sending and receiving system). It may reduce local land pressure through the promotion of out-migration or, alternatively, increase pressure by exacerbating off-site land expansion. For example, countries such as India and Indonesia face financial and technical constraints in infrastructure construction [29,30]. China, on the other hand, has rich experience in infrastructure development and is willing to invest in, for example, high-speed rail [31,32]. At present, China is engaged in the construction of transport infrastructure in many countries, including the Pan-Asia high-speed railway, the Middle-Asia high-speed railway, the Eurasian high-speed railway, and the high-speed railway of China–Russia. After completion, countries along the high-speed railway lines such as Cambodia, Malaysia, Thailand, Vietnam may have considerably enhanced opportunities for regional economic development [33], and rural areas in these countries may more easily access markets for the export of their agricultural products [34]. Rail construction with Chinese investment in Africa has helped rural out-migration, which contributes to the alleviation of stress on scarce land resources and reduces rural poverty [35]. In the telecoupled system, it may be easier to achieve SDGs (e.g., no poverty, reduce inequalities) than before for the countries with new railway infrastructure. In addition, telecoupling can have a profound impact on land expansion by facilitating the consumption preference for certain products. For example, many countries import coffee and tea, resulting in agricultural expansion and specialized agricultural development in exporting countries [36].

#### 3.2.2. Impacts of Telecoupling on Land Pollution

International trade, as the most common form of telecoupling, makes the world closely connected and may have far-reaching effects on land use. Both importing and exporting countries in international trade could suffer from environmental pollution and degradation [37]. For example, the trade in donkey hides between Botswana and China has led to land and water pollution in Botswana, because slaughterhouses discard waste products into the water supply [38]. Meanwhile, China has been the world's largest importer of waste since the 1980s; recycled products based on this imported waste have helped China's manufacturing industry grow, although, in meeting material needs, massive land pollution and reduced soil quality are outcomes [39].

#### 3.2.3. Impacts of Telecoupling on Land Degradation

Global trade is expanding through close economic linkages, within which the land-based food and forest products-related trade significantly affect land degradation [40]. Due to economic globalization and weak institutional and environmental management in many sending countries, exports of agricultural and forest products have become a major driver of deforestation, particularly in the tropics [41]. Since 2000, Brazil has been expanding soybean cultivation to meet international soybean trade demands [42,43]. Brazil became the world's largest soybean exporter in 2013 at the expense of forest removal to expand planting areas [44,45]. Malaysia has expanded oil palm plantations to produce the most widely traded vegetable oil globally, which again causes large-scale deforestation [46]. To pursue socioeconomic development, many countries unsustainably use and export natural resources, which results in massive land degradation [36,47]. For example, the popularity of high-tech products (for example, mobile phones) has led to an increase in the global demand for rare earth minerals, almost all of which are sourced from China [48]. The rare earth mineral ores mostly lie deep in the earth; exploitation of them generally involves the removal of ground vegetation, destroying topsoil, and polluting groundwater systems. Furthermore, land degradation caused by mineral resource exploitation often requires complicated landscape restoration [49] and has forced China to introduce policies restricting exports due to the increasing calls for environmental protection [50].

#### 3.2.4. Impacts of Telecoupling on Land Protection and Restoration

Telecoupling may promote land protection and restoration by international organizations, international agreements, and international reports. The United Nations Convention to Combat Desertification (UNCCD) was ratified in 1996 and has promoted vegetation restoration in arid and semi-arid areas globally. Research shows that China was the top contributor to the newly increased green area from 2000 to 2017 [51]. Indeed, China won the Land for Life Award in 2019 for its outstanding contribution to land degradation neutrality [52]. Global assessments including the first global assessment of land degradation and restoration of IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services), the new world atlas of desertification (WAD3) of the European Commission's Joint Research Centre, the Intergovernmental Panel on Climate Change (IPCC) special report on climate change and land, and the UNCCD CoP14 all focus on land degradation [53]. The United Nations has also established initiatives on ecosystem restoration, which have boosted land protection and restoration globally [54].

### *3.3. System Integration of the Telecoupled Impacts*

Telecoupled systems have diverse and complex feedbacks and influences, with coexisting positive and negative impacts on the human–land system. Hence, a comprehensive approach that can span temporal, spatial, and organizational scales is needed to integrate all the impacts of telecoupling. Decision-makers are interested in understanding the net gain or loss for a particular place caused by an investment or contract, such that deciding how to integrate the negative and positive impacts (e.g., reduce negative impacts, expand positive impacts) is very important. Systems integration means consolidating individual components of the coupled human and natural systems [20] and involves assessing the net gain or net loss arising from telecoupling. In the context of systems integration, losses and/or gains of telecoupling may be evaluated through disaggregated models, simulation models, and other methods [55,56].

Several methodologies can be used to quantify the impacts of telecoupling on land–human systems, which include planetary boundaries, environmental footprint analysis, emergy, and ecosystem services valuation (see Figure 2). Planetary boundaries are safe operating spaces for key earth system components and processes (e.g., land-use change) [57], which can help to quantify the human interventions on land from regional to global scales [58]. The environmental footprint (EF) includes the ecological footprint, material footprint, energy footprint, water footprint, and carbon footprint and is aimed at quantifying resources consumed and waste generated by humans within a system [57]. Emergy refers to the available energy that is previously consumed, directly or indirectly, to produce a product or service [59] and combines the cross-scale nature and socioeconomic system in contributing to system integration of the telecoupled impacts. The flow of ecosystem services is one of the most popular methodologies to quantify the net value gained or lost within connected systems. Ecosystem service flows involve the movement of ecosystem-derived material, energy, and information between a sending and a receiving socioecological system [60]. The service path attribution networks model, land-use/land cover matrix approach, and spatial subsidies approach are all applied to quantify ecosystem service flows [61–63].

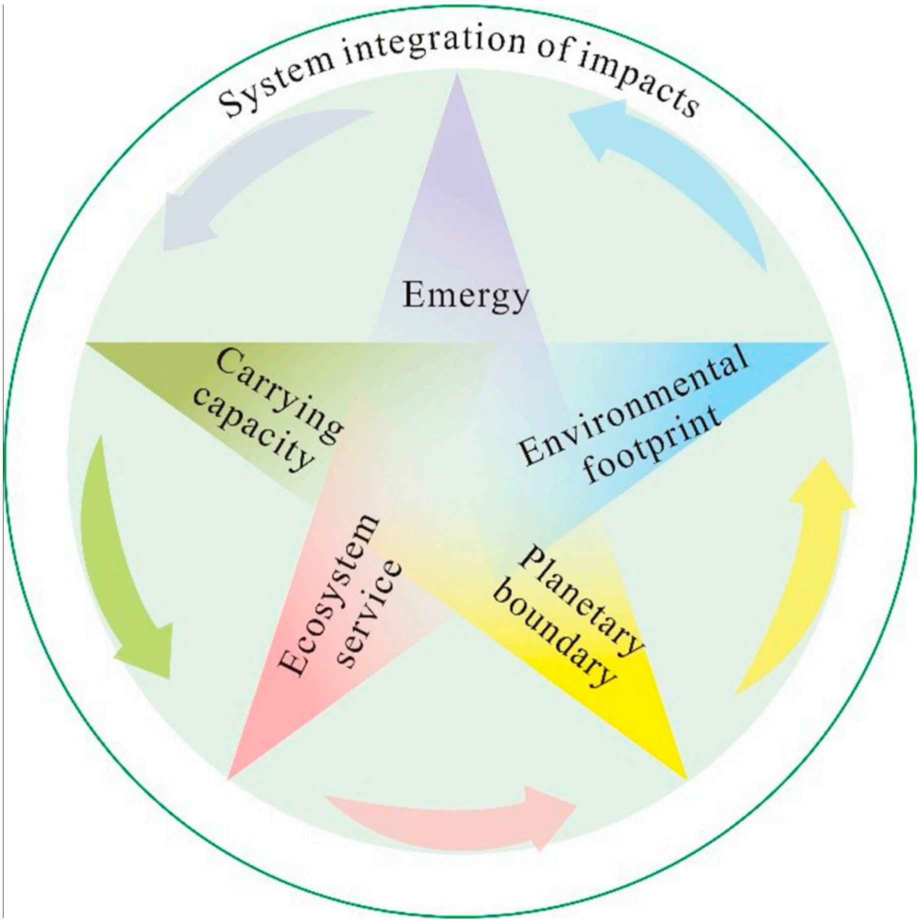


**Figure 2.** System integration of impacts from telecoupling. Notes: ecosystem services, emergy, and environmental footprints, planetary boundaries, and carrying capacity can be applied to quantify the net impacts of telecoupling on land.

Sustainable development aims to achieve a win–win situation for both receiving and sending components in telecoupled systems, and requires the identification of trade-offs and leverage synergies (see Figure 3). A win–win situation with respect to the land system due to telecoupling may occur when combining the interests of both the sending and receiving systems. Win–win does not mean that there are no conflicts among different systems, but seeks to maximize the common interests and reduce trade-offs between different systems in the decision-making process [64]. Although a win–win scenario is an ideal state and difficult to realize, there are examples that suggest such a situation is achievable. For example, both food security and biodiversity conservation can benefit through the development of the social economy; e.g., social equity, reliable access to local land, and increasing social capital and human capital [65]. To achieve a real win–win, the reduction or elimination of trade-offs is required [66].

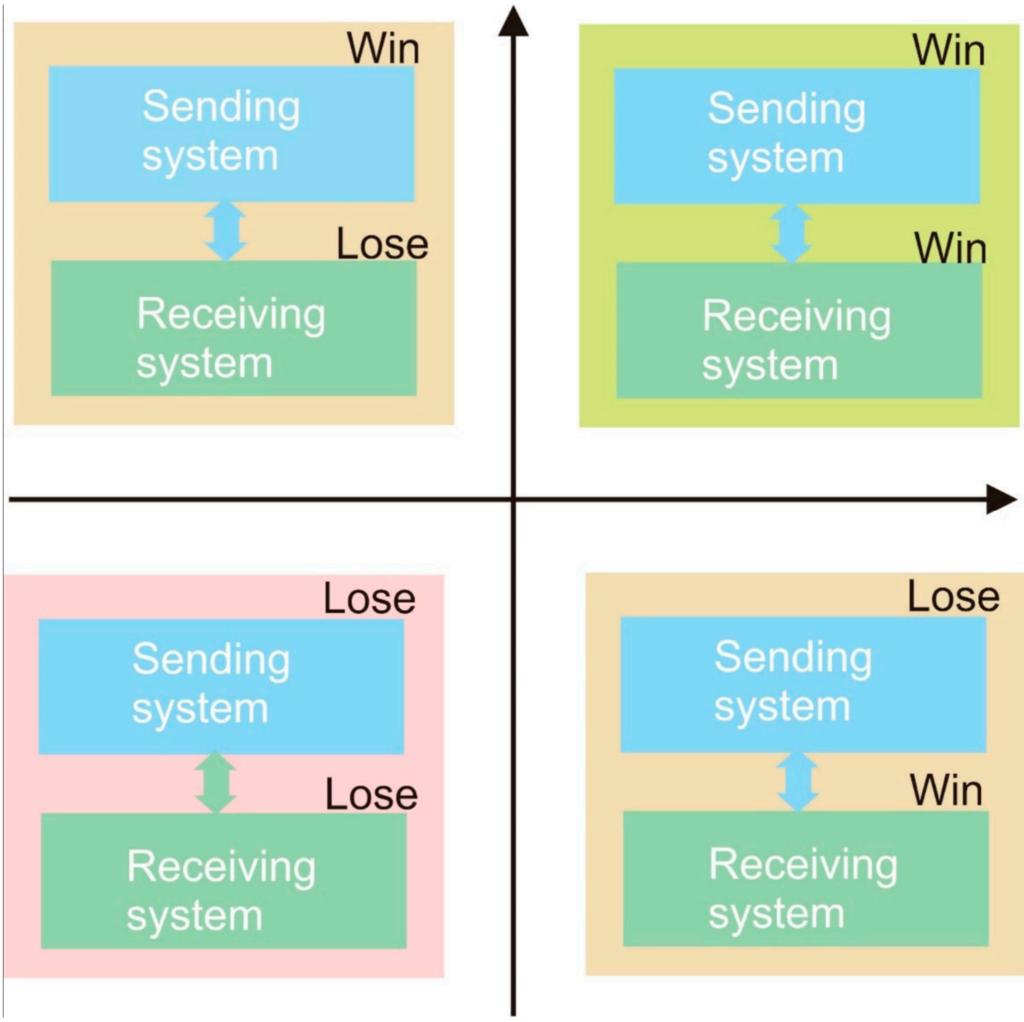


**Figure 3.** Consequences for the sending and receiving system in a telecoupled system. Notes: the two axes that intersect vertically divide the whole plane into four quadrants: the upper right section is where both sending and receiving system are in the state of "win", which is the perfect state for systems to pursue; the upper left and lower right part are situations in which one part of the system is in "win" while the other is in "lose"; the lower left part quadrant is the situation when both parts of the telecoupled systems tend to lose in the process.

### 3.4. Responses to Telecoupling for Sustainable Land Use

To leverage the positive impacts and reduce negative impacts of telecoupling for sustainable land use, we proposed four types of responses to address the undesirable impacts of telecoupling that include technology transfer and upgrade, institution and policy instruments, social responses, and economic responses (see Table 1). The objective of these responses is to improve the resilience of the land system, reduce negative impacts of telecoupling, and achieve win–win in the interacting processes.

**Table 1.** Responses to telecoupling for sustainable land use.

| Responses | Concrete Approaches | Cases |
|---|---|---|
| Technological | Technology transfer and upgrade; recycling technology; applying and developing renewable energy | Using biogas and solar energy to alleviate rocky desertification in Southwest China [67] |
| Political | Institutional organizations, sectors or bodies; policy instruments and targets (international treaties, national laws and regulations, international bilateral and multilateral treaties); implementation strategy (polycentric governance) | Polycentric governance in Sierra Leone to ensure the rational use of land [68] |
| Social | Encouraging the use of local resources; respecting indigenous and local knowledge (ILK); increase of mobility and migration | Waste deposition practices boost soil carbon accumulation [69] |
| Economical | Payment for ecosystem services (PES); reducing poverty; economic, livelihood, and crop production diversification | PES in Mexico to prevent deforestation [70] |

#### 3.4.1. Technical Responses

Inefficient steel-manufacturing technologies relied on deforestation to secure adequate energy supplies and became a serious environmental problem in China during the "Great Leap Forward" of the 1950s [71]. Improvements in wood conversion efficiency did reduce wood waste by approximately 50% [72], which in turn helped to alleviate pressure on forestland in the country. Nevertheless, for the past four decades, China has experienced very rapid economic growth and industrial relocation from developed countries and regions due to the reform and opening-up policy [73], and the environment has greatly deteriorated. This resulted from the introduction of some highly polluting industries and using outdated technologies, as well as the government not paying enough attention to environmental criteria [74]. Nowadays, many rural areas in developing countries still rely on traditional biomass (e.g., fuelwood, crop straw, livestock manure) for most of their energy, which often leads to local deforestation and desertification and can affect distant areas located downstream or in downwind areas [75]. Therefore, there is an urgent need to apply renewable energy to reduce negative impacts in these underdeveloped regions. Using biogas and solar energy, and developing solar/wind energies could reduce demand for firewood and fossil fuel and alleviate the environmental pollution and damage caused by telecoupling [67,76].

#### 3.4.2. Policy Responses

Policy responses to impacts of telecoupling on land systems include international organizations, policy instruments and targets, and implementation strategies. International organizations aim at addressing global concerns about certain issues spanning different countries and regions, which is helpful in reducing the adverse impacts of telecoupling on the land. The United Nations Millennium Development Goals (MDGs) were proposed in 2000, followed by the Sustainable Development Goals (SDGs) in 2015, with the aim of addressing urgent global problems such as poverty, environmental degradation, and climate change. International platforms such as the IPCC and IPBES have carried out assessments on urgent issues (e.g., land degradation and invasive species) and attempted to bridge the gap between science and policy.

The negative impacts of telecoupling on land can be reduced through implementing policy instruments such as international bilateral and multilateral treaties, and national laws and regulations. Although decision-makers generally do not explicitly consider the framework of telecoupling, many international policies recognize that the world is composed of different countries and regions interacting in a complex telecoupled system. In 2012 the UNCCD proposed Zero Net Land Degradation (ZNLD) by 2030, Land Degradation Neutrality in 2017, and called UNCCD CoP14, all of which focus on issues of global land degradation and restoration [77].

Implementation strategies refer to how governance gives effect to policies on the ground. Polycentric governance is often used to deal with transnational land degradation [68], and links multiple areas of governance by regulating the interdependence of social, ecological, economic, and political flows of local and remote actors to promote sustainable land management [78,79]. For example, in Sierra Leone, multinational corporations, local governments and villagers, and local and international non-governmental organizations are all involved in the management of land that was leased by a multinational petrochemical company, and provides an instructive case of a decentralized approach to efficiently manage land use in the telecoupled world [68].

#### 3.4.3. Social Responses

Social responses to negative impacts in a telecoupled human–land system aim to enable the actors to change consumer behavior and make a transition to sustainability. Such approaches include encouraging the use of only local resources, transitioning to a plant-based diet, reducing inequality and poverty, increasing mobility and migration, and respecting indigenous and local knowledge. Food miles have been coined to illustrate the distance food travels from the farm to the food table, which clearly demonstrates that the food demand of one place has a great impact on other distant places [80]. Food miles have been steadily increasing over the past several decades [81]. Recent trends towards vegetarian diets and urban agriculture can reduce food miles and related energy consumption, and can alleviate pressure on land in food-producing countries. Forest transition from net loss to a net gain in some countries has been at the expense of excessive consumption of forest products from other nations. For example, from 1961 to 2018, the value of imported forest products in China increased from 0.04 million US$ to 57 million US$, while exports increased from 0.02 million dollars to less than 14 million dollars (see Figure 4). This huge deficit has led to a sharp drop in forest areas in countries such as Cambodia, Myanmar, Madagascar, and elsewhere [15]. If China and other importers can recycle wood products and produce enough timber locally, this could alleviate the forest degradation in some timber-exporting countries, which may benefit forest protection and carbon emission.

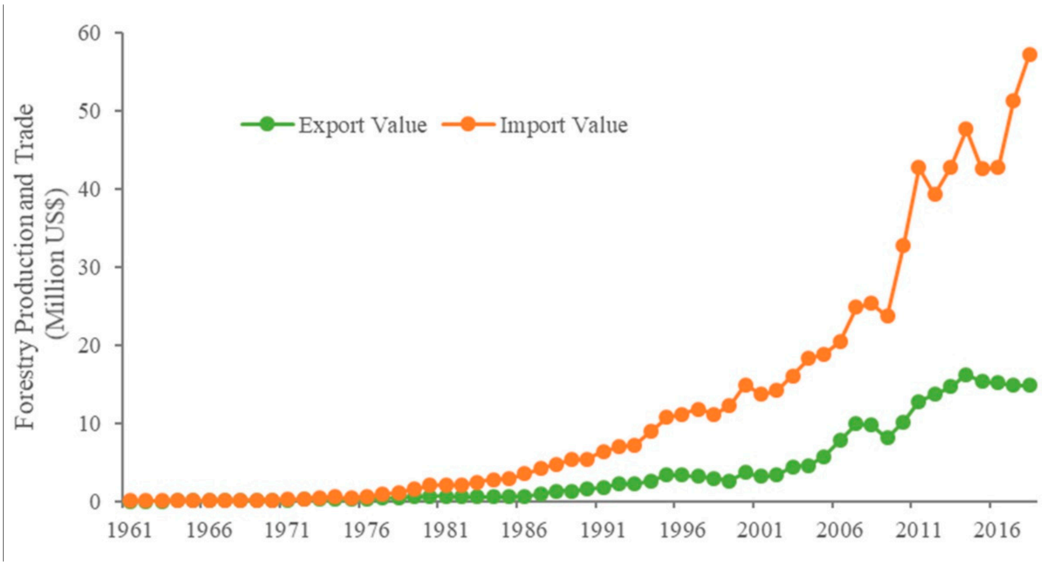


**Figure 4.** Imports and exports of forest products to and from China. Data source: FAO, 2017.

Globalization has been shown to lead to the loss of indigenous and local knowledge (ILK) about local social–ecological systems and, indeed, the role of ILK on land restoration has often been underestimated or even ignored altogether [82]. However, ILK that conserves biodiversity and ecosystems can shed light on how to keep a balance between human use and environmental protection. Compostable waste deposition practices can boost soil carbon accumulation [69]; sowing species-rich grass seed, and weeding and cleaning meadowland can help to promote grass diversity for sustained development [82]. Other land management activities rooted in ILK (e.g., rotational farming and grazing enclosures) help increase carbon stock and combat desertification [83].

The relationship between population migration and ecological restoration can be seen in both developed and developing countries. In Latin America and the Caribbean, huge areas of forest were restored between 2001 and 2010 due to migration [84]. In China, the government has moved millions of people from vulnerable ecological areas to other rural or urban areas to promote ecological restoration, including the Guizhou mountainous areas [85]. Provided the government pays attention to the local livelihoods and the traditional cultural heritage, this practice could mitigate some of the adverse effects of the telecoupled human–natural systems.

3.4.4. Economic Responses

Payment for ecosystem services (PES) can help underdeveloped areas reduce poverty and environmental degradation by providing incentives and funds for ecological protection and restoration, hence reducing the negative effects of telecoupling on the environment. For example, South Africa provides wages to unemployed people to remove invasive plants and restore ecosystems [86]. Mexico pays for private and public landowners to encourage them to proactively prevent deforestation [70]. China's grain for green policy is also helping to resolve land degradation problems in ecologically vulnerable areas such as the Loess Plateau and karst mountain areas [87]. National transfer payments for ecosystem services and population migration are effective ways to reduce inequality globally as well as nationally and may assist millions of people to move out of poverty, which may further reduce the pressure on land [84,85]. Land protection may employ a diversity of agricultural and non-agricultural activities to reduce the dependence of socioeconomic development on vulnerable land. For example, Ethiopia has changed its livelihoods strategy from agricultural production to other industries to mitigate the damage to land [88].

## 4. Discussion

*4.1. Framework to Achieve a Win–Win Situation for Telecoupled Human–Land Systems*

Here, we propose a framework to achieve a win–win situation for the telecoupled human–land system (see Figure 5). The framework is composed of impacts identification, in which impacts of telecoupling are identified; system integration, which offers an approach to integrate the full impact of telecoupling; and responses, which include technological, political, social, and economic responses. Firstly, it is necessary to determine the impacts of telecoupling on land, including both positive and negative effects. This is followed by an attempt to find a balance or optimal solution for the human–land system through the analysis of ecosystem services, emergy, and environmental footprints within safe operating spaces and carrying capacity, and integration of these impacts towards sustainable development of the human–land system. As telecoupling is dynamic, natural–human systems, system integration, and responses need to adapt to each impact dynamically. System integration and responses should complement each other to achieve a win–win situation. Policymakers should consider the telecoupled human–land system in land management and development.

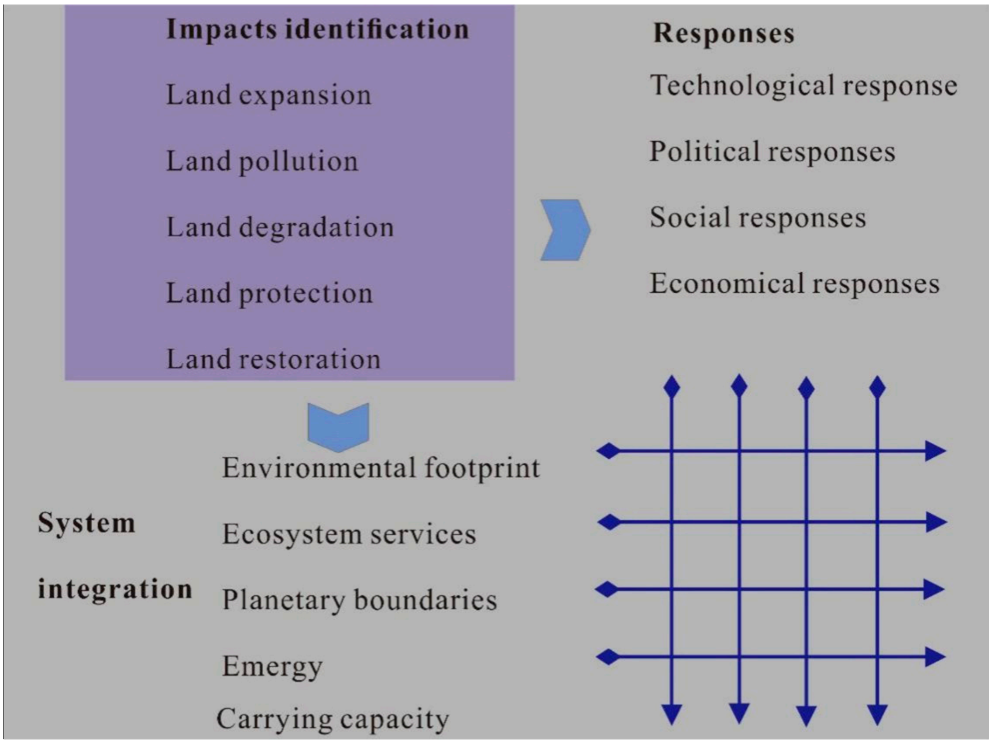


**Figure 5.** A framework to reduce undesirable impacts in the telecoupled systems, adapted from [89].

*4.2. Future Prospects*

This review focuses on the impacts of telecoupling on the human–land system, and how to integrate and respond to them, although many problems remain to be solved, in particular, at which scale or scales does telecoupling operate? Telecoupling provides opportunities and challenges for understanding issues like land degradation and global climate change. Although we propose a win–win situation is possible using particular methodologies, there are many other potentially useful methods, such as input and output analysis. Given that the global population is still increasing, and that urbanization and the magnitude of international trade are still accelerating, complexity and uncertainty in utilizing telecoupling to solve threats such as climate change and land degradation are still apparent. However, the telecoupling paradigm is breaking down regional, national, and institutional barriers, and helps to strengthen cross-disciplinary and transnational studies to achieve sustainable development of the human–land system, SDGs, and the 2030 Zero Net Land Degradation target.

## 5. Conclusions

This review systematically explores the number of publications, major scientific research institutions, and research processes related to the telecoupled human–land system through literature analysis based on Web of Science and CiteSpace. It is concluded that scientific interest in telecoupling has grown and that particular institutions and organizations are responsible for a disproportionately large number of outputs. The analysis of the impacts of telecoupling on land degradation, land pollution, land expansion, and land protection and restoration are explored. The net impacts of telecoupling on land are quantifiable through measures of ecosystem services, emergy, environmental footprints, planetary boundaries, and carrying capacity for the telecoupled systems. We also highlight technical, social, economic, and political responses to coordinate the positive and negative effects of telecoupling on land. Finally, we propose a framework comprising the identification of impacts, system integration, and responses, which may contribute to achieving a win–win situation within telecoupled systems.

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**Data Availability Statement:** Publicly available datasets were analyzed in this study. This data can be found here: [http://www.fao.org/home/en] (accessed on 12 October 2020).

Conflicts of Interest: The authors declare no conflict of interest.

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