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Integrated Land Governance for Eco-Urbanization

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Academic Editor: Tan Yigitcanlar
Received: 4 May 2016; Accepted: 23 August 2016; Published: 7 September 2016

Abstract: "Eco-urbanization" emphasizes the importance of the ecological and environmental aspects of urbanization, which is to approach a balanced and healthy ecosystem through paying attention to the ecological intercorrelation of many factors. This involves balancing the stocks and utilization of multi-resources and balancing the efficiency and equality of multi-resources allocation to improve the quality of life for both urban and rural areas. In this dynamic process, resource allocations are carried out at different administrative levels, which have posed challenges of developing an integrated approach for eco-urbanization. Due to interaction and intersection of ecological activities among adjacent regions, a complex ecosystem tends to be in a fluid catchment area with dynamic flows of activities that transcend rigid administrative boundaries. The management of ecosystem sensitively impinges on the effectiveness of having an integrated approach of land governance in a comprehensive planning of urban–rural development. This will require scientific findings to support a policy-oriented management approach, which can take account of land use/cover changes (LUCC), ecosystem services and functions, interactive impacts of socio-economic transformation and climatic variations for optimum land use allocation to achieve the objective of ecosystem conservation and socio-economic development for both urban and rural area in a sustainable approach. Three aspects of development are identified as the importance of achieving advanced land governance for eco-urbanization. This paper aims to discuss these in turn: first, to find the adaptive measures in response to the uncertainty of climatic variation; second, to understand and research the scale and level of sustainable consumption for balancing resource saving and consumption; and third, to study ecological intercorrelation among multiple factors. We, therefore, argue that the far insight of "economic growth" via an ecologically-centered approach based on scientific solutions of all three aspects and intergovernmental consultations is important to support land governance for eco-urbanization and to strike a balance between environmental conservation and economic development.

Keywords: eco-urbanization; ecological intercorrelation; land; urbanization; urban–rural

1. Introduction

"Eco-urbanization" is a process that involves ecological flows, stocks, risks, utilization, conservation, functional changes, and economic cost–benefits for sustainable development across different scales and hierarchies through networks, nexus, and interdependence of both natural and social evolutionary processes. These connections are referred to as "ecological intercorrelation" in both qualitative inquires and quantitative research [1]. Eco-urbanization emphasizes the importance of the ecological and environmental aspects of urbanization. It stresses the complex interactive effects

of synergies and conflicts between economic activities in those urban–rural communities and their local ecosystem and environment. Urban expansion always firstly affects peri-urban area, and it is highly possibly that it sacrifices local clean environment to gain economic benefits [2,3]. Valuation of ecosystem in urban fringe and rural area thereby are always underestimated according to economic impact and cost–benefit analysis excluding the assessment of natural capital. Millennium Ecosystem Assessment and Costanza have tried to involve social aspects from a far sight of view to estimate the valuation of ecosystem and natural capital [4,5], but there are many arguments regarding well-performed assessment methods, and the lack of a well-designed conceptual framework. Eco-urbanization hence aims to develop a society for the sustainability of urban–rural development, efficient resource consumption, and minimization of environmental impacts within a dynamic interactive process. To achieve this objective, an advanced strategic planning approach is aiming to mitigate impacts, adapt and reshape urban growth in a sustainable ecological manner. Because it is constructed to improve the livable environment and based on historical experience and international practices, eco-urbanization emphasizes the "ecological" perspective, thus it is different from the conventional notion of "urbanization" as the latter tends to have a strong intonation of economic growth and scale effects from an increasing demand perspective. It is also arguably different from other policy concepts, including "sustainable cities", "green cities", "digital cities", "smart cities", "intelligent cities", "information cities", "knowledge cities", "resilient cities", "eco cities", "low carbon cities", "livable cities", etc. [6,7]. Therefore, eco-urbanization promotes innovative practices and effective strategies to research scientific solutions to support more feasible management and progressive planning for a process of sustainable urbanization in many countries.

The nature of eco-urbanization is to approach a healthy ecosystem. It is a dynamic process in which the growth of multi-resources usage can be balanced to maintain the resource stock for sustainable consumption. This process can fulfill higher efficiency of multi-resources allocation and advanced economic utilization as much as possible to achieve social equality of various communities, and thus has a distinct inclination to correct the Machiavellianism profit-driven economy. The concept of efficient recycling is one of critical parts in this evolutionary process [8]. Nonetheless, we address an abstract issue beyond the meaning of waste recycling. With complex interactions in eco-urbanization, waste cycling experiences a mixed transformation through both natural environment and social production systems. It hardly achieves zero pollution by just adopting advanced technology that stress human efforts and behaviors in industrial production as it also requires the function of ecosystem cycling. To sustain a healthy urban ecosystem, ecological intercorrelation in this process cannot be ignored in an expanding city. For instance, if a small producer does not use wastewater disposal technology, sewage is discharged directly into the nearest river. Water pollution contaminates the soil and vegetation in a watershed, damaging the nutrient cycle, and the capacity of regional ecological resilience is challenged. It is highly likely that some ecosystems will take much longer to recover under the uncertainty of eutrophication and climatic variations in some regions [9–11]. It indicates that the cost of pollution abatement is much higher than pollution producer. Under this situation, opportunity cost of pollution control will be much higher than the investment of technology innovation. Therefore, it is highly likely that there would be less motivation for green innovation because of the much lower cost of pollution if these regulations were not enforced. Another case is that extreme weather such as rainstorms can induce uncertainties to the relationships between hydrological power and regional geo-risk, which consequently limit urban development [12]. Some regions located in mountainous areas are highly threatened by uncertain geo-risks. Such inappropriate policies of "mountainous urbanization" in geo-risky regions can easily distort the goodwill of regional climatic adaptation and shape the path of social development to a wrong direct though a decision making process at different levels of land governance [13,14]. Thus, multi-resource recycling across various ecosystems through ecological linkage, interaction, and intercorrelation construct a huge recycling process. Sikor et al. have addressed that global land governance tends to seek scientific solutions by researching flows of resource and energy consumption beyond the terrestrial approach, focusing on

local natural changes mainly because transboundary issues often occur [15]. Thus, multi-resources allocation at each nexus needs to be identified in a scientific manner to clarify how to maintain the equilibrium of ecological health with multi-resources allocation, because this is the kernel of eco-urbanization across different administrative boundaries.

Natural distribution of multi-resources is the main constraint of eco-urbanization because of geographical and geological characteristics across administrative boundaries at different hierarchies. This means that unreasonable resource allocation generates inevitable uncertainties and impacts through various ecosystem services at all administrative levels [16,17], which can distort the functions of resource within a complex trade system, and possibly drag an ecosystem into a vicious cycle that deviates from the path of sustainability in some regions. Consequently, this mechanism induces risky socio-economic transformation with unexpected/unpredictable negative outcomes, which has aroused public awareness to ecosystem conservation [18]. For instance, water pollution at the upstream river has impacts on the downstream ecosystem because it can dissipate into soil and groundwater, endangering the health of all species living on the polluted water source. Even if the rights of water use and land property are clearly clarified, the governance of transboundary pollution still has high transaction cost and even generates more conflicts on the border. Moreover, if there is no appropriate compensation system, all residents in this watershed will have a net loss of social welfare [19]. Under this circumstance, the issue is not only the so-called unclear property rights as the Coase theorem stresses, even if it can explain the internalization of the negative externalities, but also the issue becomes an ineffaceable limitation to reach the first or second best solution to sustain a certain level of social welfare [20]. New institutional economists prefer precise laws and regulations, and less rhetoric, in economics studies to make progressive and applicable policies that aim to lower potential transaction costs across hierarchies and to minimize structural effects on internalization of negative externalities [21,22]. In particular, when there are many executive levels to take charge of an issue, the cost of human capital will increase, and some irresistible profits will propel "gray" governance—the shadow of hierarchy [23]. This means that a specific administrative level will no longer strictly execute the responsibilities of a public event, and thereafter, conflicts due to regional protectionism will again occur on the border.

The ecological intercorrelation of environmental impact factors among adjacent regions combines various ecosystems, which means the process of eco-urbanization relies on effective governance of integrated land use at different levels for urban–rural development [1]. It addresses linkages inside of an ecosystem and among various ecosystems for integrated regional governance of environmental management. Fu et al. emphasized that ecosystem resilience through linkages in the ecosystem processes are crucially important to environmental management [24]. Administrative-based governance is not sufficiently robust and flexible to support integrated environmental governance across related geomorphic units. For instance, watershed, forest, and grassland management usually have border issues when the ecosystem transcends the boundaries of adjacent administrative regions. Some large countries such as China and Brazil have multi-level governments, which very likely leads conflicts between "decentralisation and territorialisation" and "counter-trends of recentralisation and hierarchisation" [25,26]. Thus, boundary issues involve both physical and abstract economic benefits and losses due to uneven distribution of natural resource and political power, which sorely calls for academic support and evaluation from the scientific perspective.

In the process of eco-urbanization, land use policy at various administrative levels generates conflicts but can also be the solutions. Hilson discussed the conflicts between mining land use and adjacent communities' livelihood. He suggested that environmental damage should be directly compensated to individuals in the adjacent communities [27]. In some large, nationwide ecological projects such as "Grain for Green" in China, the ecological compensation accounts for a small part of peasants' income, usually lower than 17 percent of the total annual income in those regions being deployed by the projects, while the transaction cost across administrative levels are seldom reported [28,29]. This raises some questions. Should environmental management be according to

administrative level or geomorphic unit? Should all resource be according to a same managerial framework? For instance, New Zealand has an environmental governance system that is different from the boundaries of the administrative system. The agencies of environmental departments can manage and penalize illegal behaviors across boundaries to prevent damaging grassland and water that occur through terrestrial connection in the same ecosystem. Their evaluation depends on ranges and standards from scientific findings on environmental impacts on neighbors. Thus, the ecological intercorrelation of multiple factors is the base of how to develop a robust conceptual framework to capture the key variables in eco-urbanization and to find their interactive effects on resource consumption and environmental impacts in order to identify the key characteristics, build an efficient managerial framework, and approach a "wellbeing"-oriented sustainable future.

The main challenges to reach appropriate land use policies in the process of eco-urbanization is to develop a comprehensive re-planning system to manage land use/cover changes (LUCC); research ecosystem services and functional changes [30] to understand their interactive impacts on socio-economic transformation and climatic variations; and support policy-oriented management of optimum land use for ecosystem conservation and socio-economic development in a sustainable approach. Major methodological challenges are dynamic modeling and comprehensive assessment of the performance of eco-urbanization. This aims to improve strategic adaptation of regulatory planning, to compare with international practices for mitigating and managing negative impacts of urban growth, and to seek adaptive measures in a sustainable manner.

In the rest of this paper, we will firstly describe main issues in the process of eco-urbanization, such as governance related issues of livable and environmental justice, housing prices, and transportation in urban expansion. Then, relevant research on urban ecosystem, and climatic variations and environmental pollution, in and adjacent to the city will be discussed in Section 3. This will be followed by an illustration of how eco-urbanization can be achieved by sustainable saving and consumption of resources to improve urban–rural wellbeing in Section 4. Sequentially, we propose how an integrated approach of land governance under the imperfectly competitive market economy can be developed to support decision-makers in the process of eco-urbanization in Section 5, and, finally, this discussion will end with our conclusion in Section 6.

2. Researching Eco-Urbanization

Eco-urbanization calls for solutions to many practical issues through efficient regulations and management to minimize environmental impacts, which appeal to integrated scientific solutions to better governance of resources. Large-scale urbanization started from the 1980s, which was the outcome of an intense policy-oriented stimulation of urban development in Europe, China, and many countries in Central and South America [31–34]. Figure 1 shows a comparison of the urbanization rate in the United States, United Kingdom, Germany, Australia, China, and Mexico, as well as the world average [35]. Although each country has faced various situations, to increase urban population is the same target. It is easily observed that urban population growth in China (Figure 1, red line) has a steeper increasing trend than other countries. After the opening-up policy and subsequent reform in China, some regions only focused on economic growth, regardless of the environmental capacity, which led to many environmental issues. A structure of traditional rural agriculture and urban industrialization has been shaped by the fast pace of urbanization [36]. In recent decades, the urbanization rate of the population has been widely regarded as an indicator of good governance by both national and provincial level administrations, which represents a mayor's political performance during his/her term of office [37]. Simultaneously, many far-sighted researchers have paid much attention to environmental conservation. Hence, academic views stress the importance of coordinating development for both economic performance and environmental preservation. However, the urbanization process is not only about having more urban population, but also about enhancing the standard of urban and rural living, within a better environment.

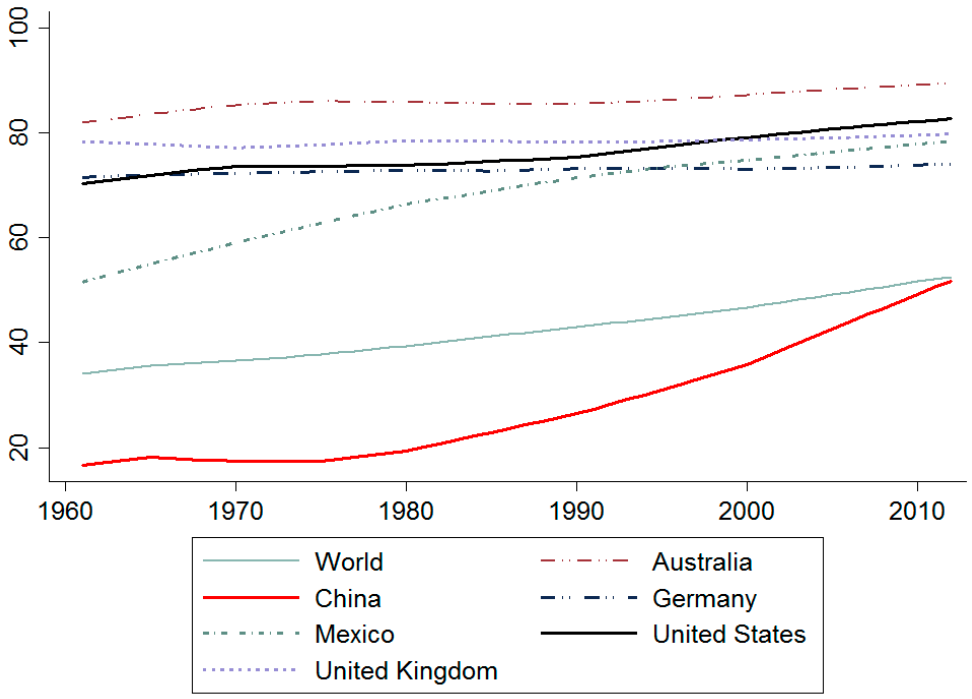

Figure 1. The urbanization rate of United States, United Kingdom, Germany, Australia, China, and Mexico, as well as the world average [35].

Rapid urban expansion in populous countries brings about some huge social transformation processes that induce massive labor mobility from rural to urban areas [2,3]. This process in China has resulted in housing price rises, first in the large cities, which has then trickled down to smaller cities. This pricing transmission mechanism, through inter-regional facilities, combines the multi-dimensional impact factors of economic performance and environmental quality into an integrated system in which interactions among each other become more complex. For instance, more people move out of the city center to the suburban area for more spacious accommodation, while lower income people move into urban slums (known as "village-in-the-city") [38]. It induces longer distance commutes between homes and offices, which triggers brisk demand for transportation. In addition, the high density of buildings and the large volume of vehicle exhaust emissions have caused heat island effects in the city [39]. Thus, specific solutions, including policies regarding to emission mitigation, regulation on vehicle emission test, criterion of green building and engineering, promotion of low-carbon lifestyle, etc., have raised public attention from different fields. However, there is still a lack of clear descriptions to a conceptual framework in which highly efficient regulations and management approaches can be concisely clarified for how to make concerted effort to lower environmental impacts on large cities [40].

Furthermore, inappropriate land use policy can easily affect the outcomes of eco-urbanization because environmental governance is fragmented by administrative management of urban infrastructure. Li et al. argued that urban green infrastructure is not only decorative, but is also crucially important to urban climate and ecosystem [41]. Nonetheless, green infrastructure in cities may also have unclear impacts on environmental capacity and can have uncertain constraints on the services and functional changes of the ecosystem [42]. Inner city issues on biodiversity or cleaner production have attracted debates on public goods management [43]. A typical example is the integrated green belt in Beijing-Tianjin-Hebei, which began construction in 2000. It aims to plant trees to protect large cities from sandstorms. However, before regulation and policy of compensation were set up, those neighboring small towns and cities have to take the opportunity cost of uncertainties of habit changes, even though the better ecological function may lead to a more livable environment. For example, "*Angel Road*" on Beijing Normal University campus, the name of which was transliterated

from the Chinese language meaning "bird droppings of the crows perching on the tree beside the road", although it somehow indicates a well conserved location for the bird inhabits, it brings about some negative environmental externalities as well. It infers that a huge opportunity cost of green infrastructure challenges the efficiency of engineering and industrial production. With uncertainties of climate changes, major efforts to study green facilities are thus pressingly needed in many fields, including politics, climate change, natural resources, ecosystem services, social factors, economic performance, and environmental justice. Ultimately, the implementation of these fields requires further research on more appropriate and effective functional allocation of land resources.

3. Ecosystem Service with Climate Change

Urban–rural environmental conservation in response to climate change is based on integrated land use governance and driven by re-planning oriented land use policy. There are three main questions surrounding ecosystem services with climate change in the process of eco-urbanization. First, if climate change really occurs, what impacts do climatic variations currently have on regional environment that are different from the impacts occurred thousands and millions of years ago? Second, if urbanization induced ecosystem degradation really does occur, how are the impacts of continual urbanization on present human wellbeing different from the impacts that occur within periodical variation? Third, how can urban green facilities mitigate negative environmental impacts of urbanization, and how much contribution is necessary to mitigate the conflicts between environmental conservation and economic development?

Ecosystem service changes involve many important factors, the most important being climate change or climatic variation [44,45]. The change of the plant communities and the extinction of biotic species are found to be related to global warming, but some regions become colder and the spatial distribution of precipitation becomes more uneven than before [46]. Hence, uncertainties of climatic variation severely challenge the efficiency of natural resource allocations for sustainable socio-economic development and ecosystem conservation. For instance, Qinghai Province of China is mainly covered by grassland. The origins of the three main rivers (Sanjiangyuan including the origins of Yellow River, Yangtze River, and Lantsang River) are located on the Qinghai-Tibetan Plateau in the south of Qinghai and these rivers flow down to the Eurasian plate of Southeast Asia. Harsh weather with natural hazards can lead to an average 40 percent reduction of husbandry production. Local people thereby increase feeding livestock by overusing the natural grassland, leading to a decrease in the Net Primary Productivity (NPP) of the grassland [47]. Thereafter, this decreasing of grassland ecosystem function increases the probability of climatic variation, and the regional environment becomes more fragile than before [48]. On the other hand, the most of less educated local herdsmen still rely on sales income of livestock (over 90 percent are yaks). Unlike the majority of households in China, under the policy of benefiting minority people, local populations increase continually due to no regulation of birth control. There is still a "lucky" portion of the young generation who can become herdsmen with a large amount of grassland, but with an increase of consumption demand and more ambitious livestock production. There is also a proportion of "ecological resettled herders" who have to move out of Sanjiangyuan and some other ecological conservation regions, and then move into the adjacent cities with some annual compensation that is lower than their previous livestock sales income [49]. Thus, coordination of "wellbeing"-oriented economic growth and "ecological conservation"-oriented climatic adaptation calls for integrated land governance and re-planning conservation region through ecological intercorrelation.

Strong effects through ecological intercorrelation of many factors determine the interrelationships and interdependences among adjacent regions in the process of eco-urbanization. The conceptual framework of ecological intercorrelation for regional studies on ecosystem service with climate changes is shown in Figure 2, which illustrates that land use policies are the key drivers of systematic impacts. These land use policies are closely related to different aspects of development: food security, economic valuation of ecosystem services (for each quantitatively estimated unit of environmental degradation),

mitigation of climate hazards (in terms of cost–benefit to environment capacity), human health risks, and social and cultural transformation (quantitatively and qualitatively estimated impacts). The fundamental drivers of the eco-urbanization process, regional characteristics in geomorphic units, natural resource stocks, and regional climate, can trigger conflicts between centralization and decentralization of resource allocation, which are often ad hoc when facing climate change. Thereby, regional assessments and governance of environmental impacts determine either positive or negative outcomes of ecosystem service conservation in the process of eco-urbanization. Some regions successfully introduce stakeholders' and individuals' choice into the environmental governance framework to promote local economic development by ensuring that local livelihood can benefit from the process, while other regions suffer from severe environmental degradation because of inappropriate land use planning such as illegal mining, hunting, and harvesting [50]. It is clear that understanding and clarifying interactions between ecosystem and climate change is the first necessity at regional scale. Studies on the internalization of positive externalities at regional level are vitally important to devise a robust methodology to evaluate public and common-pool goods for both economic efficiency and ecological efficiency of ecosystem service conservation [51]. Thus, human *pre*-and-*post* behaviors based on an integrated approach of land governance have critical impacts on managing and reducing negative externalities.

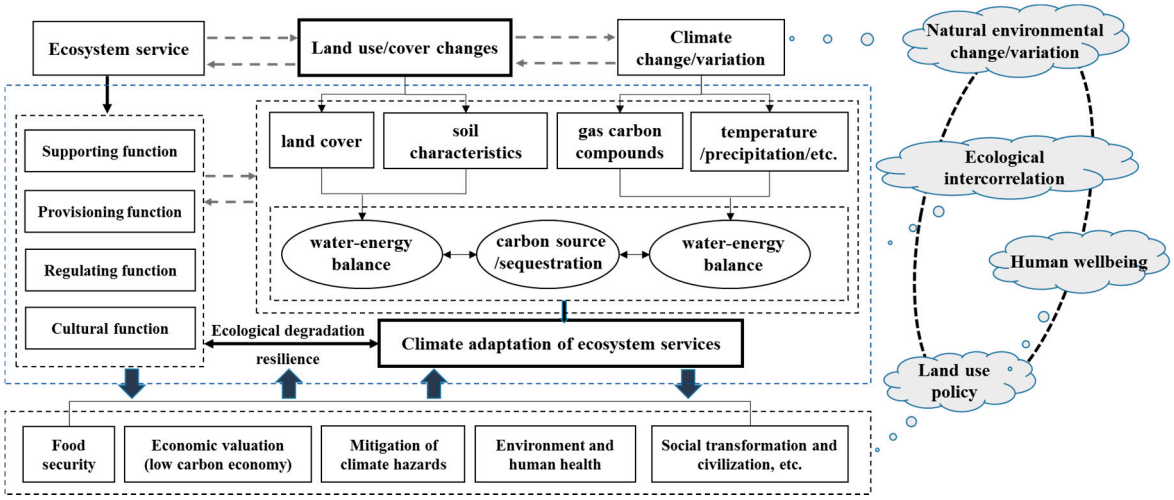

Figure 2. The conceptual framework of land use policy through ecological intercorrelation for regional study on ecosystem service with climate changes.

4. Sustainable Saving and Consumption of Resources

Eco-urbanization is not only a conceptual term, but also a series of schemes aiming to achieve both improvement of quality of living and economic development for all urban and rural areas. Hence, living space, green space, and commercial space have to be co-designed in the same plan within a governance framework. It can be layered and managed with the constraint of land use structure. In this case, the stock of land and other resource stocks are the main constraints of eco-urbanization, which are highly relevant to manage sustainable consumption [52]. In essence, how to balance the utilization and the stock of both renewable and non-renewable resources is thus the key question of sustainable consumption. Efforts to quantify levels of resource consumption and environmental impacts can contribute to evaluating the sustainable use of natural resources for human wellbeing. This promotes research on how to balance the relationships of inputs and outputs, processes and impacts on economic growth for urban–rural development, and can support a better decision making of urban management framework for eco-urbanization.

It is highly likely that inappropriate land use structure is the main cause of urban pollution. In many urban areas, industrial production has not been the main cause of over-emission and

air pollution. Instead, some rural villages adjacent to large cities become the main pollution producers [53]. The interactive relationships between energy consumption and economic growth in different regions and countries are still unclear [54,55]. However, what has become clear is that the global tendency of the total energy consumption has been continuously increasing, which is probably caused by the fact that many developing countries with lower income are still undergoing rapid development and urbanization. Research on the future turning point of the Environmental Kuznets Curve (EKC) is still full of uncertainty [56]; however, it is clear that understanding the elasticities between energy consumption and resource stocks can better inform us on the management of natural resource utilization for sustainable development. Three main research questions have to be answered: (1) understanding the impact of individual choice in consumption behaviors; (2) studying the relationship between income level and overconsumption of resources; and (3) identifying how individual saving influences the process of capital accumulation for sustainable green economic growth and environmental conservation. In the process of eco-urbanization, the representative indictors are the stocks of housing and land in various functions.

Moreover, integrated governance of land resource is necessary before income levels reach a certain high level. Arrow stated that economic growth would eventually benefit environmental amenities because people would pay much higher cost to prevent the livable environment from being polluted and degraded when income reaches a certain high level, i.e. passes the turning point of the EKC [57]. It is highly possible that there is a threshold of quality of life; that is, when economic growth and associated income reach a certain high level, people will pay much less attention to relative consumption and luxury products [58]. However, when there are large gaps in the relative income across different levels and the quality of life is not satisfactory, moral hazards such as envy, greed, and laziness can definitely induce overconsumption because individuals always pursue utility maximization [59]. There is thus an urge for better management of both renewable and non-renewable resources to avoid overconsumption of environmental quality. Before income level reaches a sufficiently high level that liberals prefer to support the less regulated institutions, only integrated governance of resources at the appropriate regional scale can provide an effective framework to minimize the cost of environmental degradation, and to improve living standard for approaching green economic growth.

5. Integrated Land Governance

Why is land resource the most important natural resource? Because land in the terrestrial system carries all geographic, climatic, and socioeconomic factors; almost all human lives on land; and all other resources related to development are in, on or above land. Therefore, land use policies are the key tools of regional planning and to ensure that social transmission mechanism can be driven by relevant impact factors on the right optimal path. For instance, the land use policies adopted in China's "13th five-year plan" are associated with those indicators, as shown in Figure 3. It demonstrates that land use policy drives the changes of social factors. As Ciriacy-Wantrup and Bishop stated, "common property is everyone's property", which can lead to disorderly resources exploitation, and result in overconsumption [60]. The lowest governance level of land resource management is at the community level, which is prone to ineffective practice. In this case, more effective institutions at different governance levels have to be introduced [61]. Isham et al. reported that poor institutions have entrenched in the economies of many countries with lower income, and the reformation of resource management in these countries are much more difficult than in developed countries [62]. This "curse of natural resources" has led to some countries with abundant natural resource experiencing lower economic growth [63]. Thus, land use policy has been the main driver of strategic planning of eco-urbanization through managing ecological intercorrelation at different administrative levels to pursue sustainability of both economic and social wellbeing.

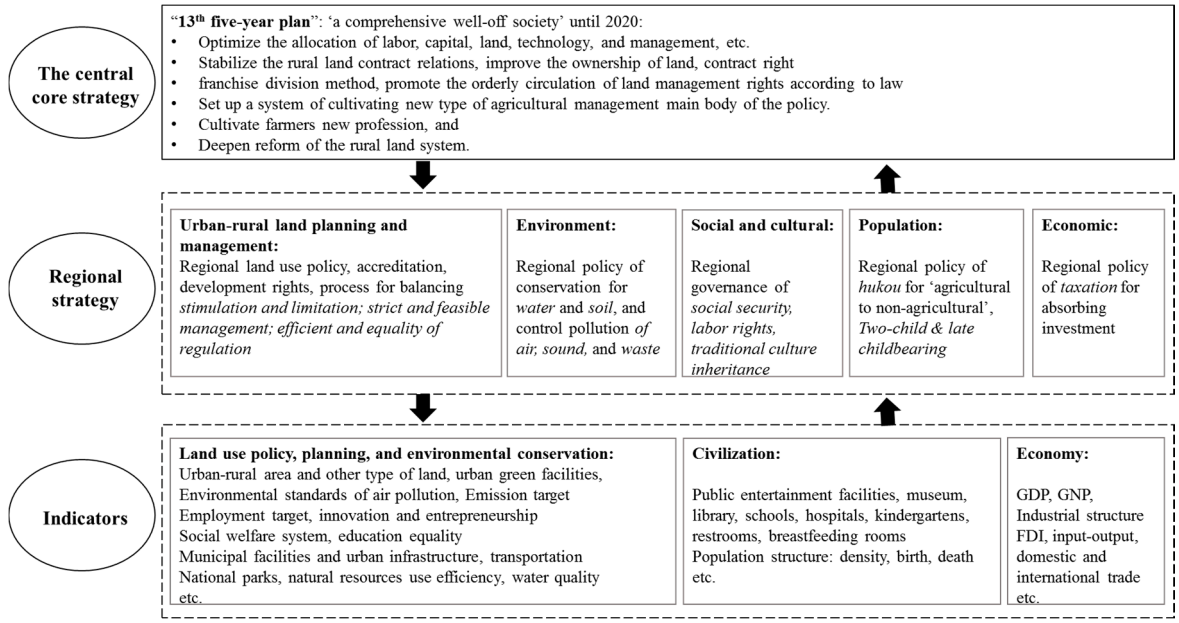

Figure 3. The land use policy and relevant indicators in the "13th five-year plan" of China (until 2020).

Eco-urbanization stresses the minimization of environmental cost and transaction cost in the process of internalization of externalities. An integrated approach of land governance is a set of advanced solutions to mitigate border issues, to improve watershed or ecotone management in an idiosyncratic geomorphic unit, and to enhance the efficiency of regional governance across different administrative levels. For instance, Kalnay and Cai discussed urbanization as the main cause of regional climate changes, such as many adjacent rural regions beside cities suffering from air pollution [64]. Urban expansion in the Beijing-Tianjin-Hebei metropolitan area is an illustrative example. About ten percent of rural areas have been converted to urban area, and an over 120 km swath of forest around the center of Beijing has degraded severely during the recent decade. Likewise, some remote rural areas with much less human intervention also suffer from severe natural environmental degradation [65]. Therefore, integrated land governance has critical function to supervise urban–rural coordinative development and to protect vulnerable regions from climate change in the process of eco-urbanization.

The main challenge is to quantitatively monitor and clarify the causality chain of LUCC, ecosystem services and functions, and their interactive impacts on socio-economic transformation for eco-urbanization. During this dynamic process, LUCC is driven by both policy-based human activities and climate change through ecological intercorrelation of multiple factors of ecosystem services. Thus, dynamic modeling of LUCC can critically provide some quantitative evidence for decision making in which multi-dimensional factors including regional land use policy, geographical characteristics, and agent-based individual awareness can be taken into consideration [66–68]. Under scenario-based simulation of changes in natural resources and ecosystem services, the interactive socio-economic impacts and their feedbacks to the ecosystem services will be analyzed to provide policy intelligence to inform decision makers and other stakeholders. Figure 4 provides an example of LUCC across domestic administrative boundaries of China during 2000s. Based on this information, the performance of land use policy at different levels of administration can be clearly evaluated and predicted. The relevant performance indicators at the level of policy implementation can also be identified by spatial interpolation. This can serve for simulation and forecasting of dynamic land use/cover changes with these linkages and interactive impacts of socio-economic transformation to support decision making regarding a set of land use policies. In Figure 4, the land use changes of the three largest metropolitan regions, Beijing–Tianjin–Hebei, Yangtze River Delta, and Pearl River Delta, are more complex. Land use changes in northeast China are also complex along the provincial borders.

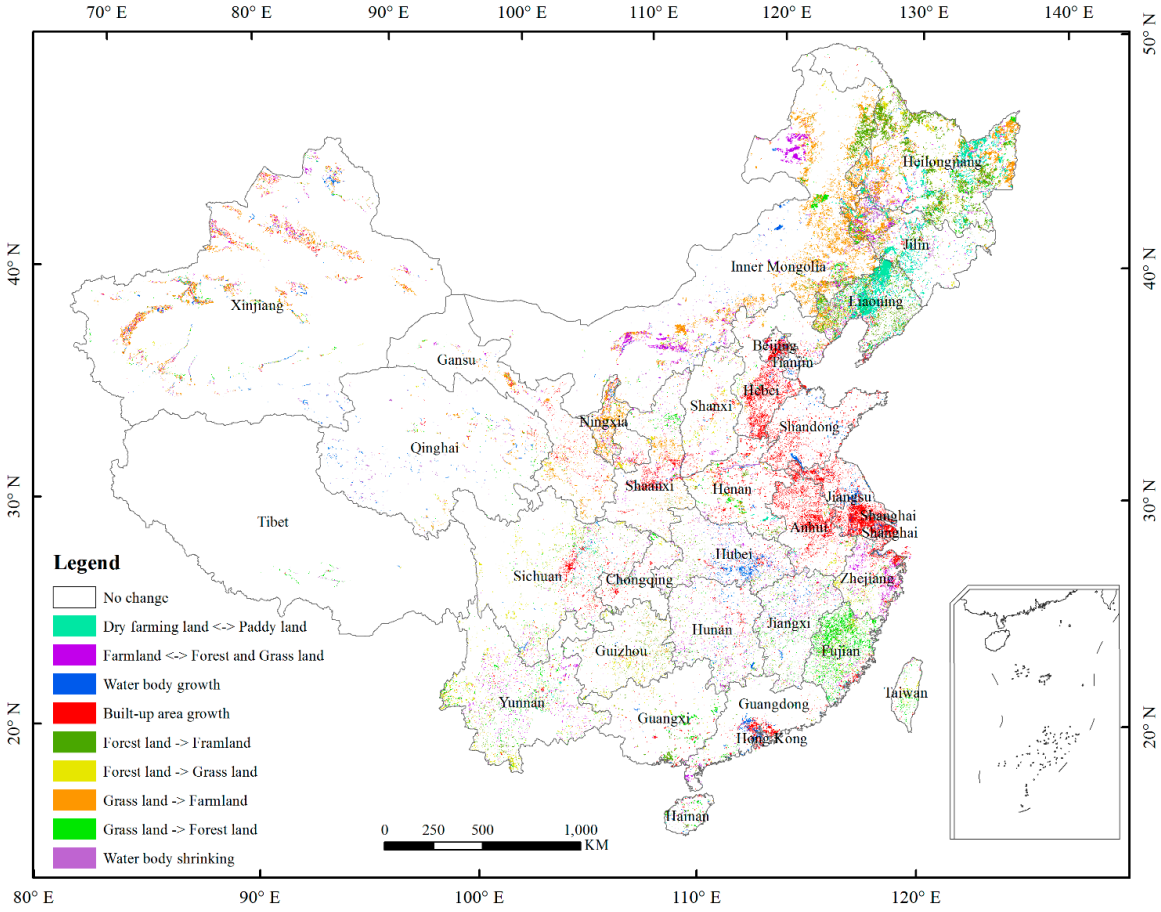

Figure 4. Example of land use/cover changes across the administrative boundaries in China during 2000s.

To better support decision making of integrated land use, qualitative consultation can complement quantitative analysis of seasonal research to develop a framework of integrated land governance, which can make progress toward an optimized decision making process for eco-urbanization. Regional governance of land and landscape planning is based on a structured system with ecological intercorrelation among the variables of industries, residential dwellings, and natural conservation parks [69,70]. For urban–rural development, research on regional land governance addresses the problems of self-originated institutions that usually lacks strong executive power to solve transboundary environmental issues, which are always complex, with different stakeholders being involved to try to develop more efficient, effective and innovative solutions and to produce strategic plan with multi-targets to regional sustainable development.

A qualitative approach thereby aims to coordinate consultations across different administrative levels to have more natural scientific based research findings to support the decision making process. It shares some similar perspectives of "meta-governance" that looks for coordinated solutions and weakens the hierarchy of various administrative levels [71,72], but also has different perspectives to address regional execution and achievement of land use policies for eco-urbanization. For instance, China has a large population at each administration level. Qian and Wong have presumed that land use policy at township level is the most feasible using a qualitative approach [73]. We did a quantitative analysis by employing remote sensing data [74,75] and a survey data of peasants' cultivated land use transferred in the North China Plain during 2000s. It quantitatively illustrates that land use changes occur more easily at the township than at the county level. A comparison of the results is shown in Table 1. By employing some appropriate statistical analysis tools, we predicted the probability

of total cultivated land changes at household, township, and county level. The findings show that: (1) the probability of total cultivated land changes decreases when the estimated level becomes higher (from household to country level), which illustrates that the downscaling of administration stimulates resource transaction, and, based on common sense, the model is deemed to be robust; (2) predicted increase in probability of land transaction tends to converge at the township level, with higher ratio than other estimated levels, and vice versa in predicted decrease probability, which demonstrates that variation of land transaction at different administration levels is quite different and land use policy at townships level is the most feasible; and (3) the selected socio-economic factors induced marginal effects at each estimated level, as reported by a longitudinal interval within integrated panels, which illustrate that land use policy at township level is the most feasible within higher and stricter statistically numerical intervals. Thus, our results proved the qualitative statement of Qian and Wong [73]. It infers that the qualitative consultation is a vitally complementary aspect of quantitative findings from the purely academic perspective. The combination of quantitative simulation results and qualitative administrative advice on land use structure can well serve regional planning for urban–rural synergetic development in the process of eco-urbanization.

Table 1. The comparison of results of cultivated land use transfer in the North China Plain during 2000s.

Obs = 4615	Household Level	Township Level	County Level
Predicted probability of total Cultivated land changes	3.42%	2.53%	0.77%
Predicted increase probability	2.49%	2.53%	0.56%
Predicted decrease probability	0.93%	0.00%	0.21%
Marginal effects (mu)	$[e^{5.28}, e^{5.33}]$	$[e^{5.38}, e^{5.40}]$	$[e^{5.31}, e^{5.33}]$
Longitudinal interval (mu)	$[e^{4.18}, e^{6.77}]$	$[e^{4.51}, e^{6.34}]$	$[e^{4.26}, e^{6.61}]$
Predicted Mean (mu)	201.4	213.92	209.69

More significantly, to improve living standard of human beings, further research on the impacts of regional cultural factors of economic benefits and ecosystem conservation is critical for eco-urbanization [76]. The issues of governing resources that we are facing today have quite similar aspects as several hundred years ago, but have already been understood and analyzed by advanced knowledge of the relationships between natural environment and human communities [77,78]. Endogeneity of investment to environmental amenities becomes a critical component of minimization of transaction cost in economic governance of common resources [79]. It predetermines economic performance and environmental degradation of regional community due to idiosyncratic features of regional demography [61]. Cultural factors drive social transformation as well as have significant constraints of local geographical characteristics in which the premium of natural resources endowment is highly likely to depend on local awareness and respect of nature. In this case, managerial regulations and institutions are far beyond fixed physical boundaries. Therefore, it also calls for an integrated approach of land governance to support eco-urbanization by considering geomorphic conditions that are transboundary.

6. Conclusions and Discussion

Eco-urbanization involves many different aspects and factors through ecological intercorrelation, in which land use policy oriented re-planning is the fundamental pillar of healthy and orderly regional development. It involves issues of ecological flows, stocks, risks, utilization, conservation, functional changes, and economic cost–benefit for sustainable development across different scales and hierarchies through networks, nexus, and interdependence of both natural and social evolutionary processes. We suggest calling all of these connections "ecological intercorrelation", as referred to in both qualitative and quantitative research. Because it is too complex, clarification and identification of the clues become much more significant, especially to those large developing countries. From the global perspective, as the most populous country in the world, China is facing severe conflicts of

resource utilization to support domestic regional development. Resource scarcity has started to pose sufficient threats to the target of eco-urbanization, so that efficient allocation of resources is even more critical to satisfy brisk demand for driving economic growth at a high speed. Notwithstanding that international trading of raw resources and low value-added products can somehow ease the pressure of environmental degradation for a specific region (particularly those with strong political power), it is regarded as a myopic strategy to achieve global sustainable development. For example, Brazil has been experiencing a growth of deforestation with increasing exports of agricultural production [80]. From the perspective of regional sustainable development, therefore, we suggest paying much more attention to transboundary issues for integrated land governance with a progressive plan. Based on previous research studies [81–83], we develop a robust theoretical framework to systematically examine the development processes. It metaphysically illustrates that ecological intercorrelation between regional and global scales through physical ecosystem flows and interactions with changes in regional characteristics can be effectively managed. Land use policy oriented re-planning of every region can be improved to fit and reshape this dynamic process in order to mitigate environmental impact and enhance the capability of climatic adaption for human wellbeing.

Before income level reaches a certain threshold (reaches a high enough level within a pure liberalized market), integrated land governance is vitally critical to guarantee the minimization of environmental costs and the improvement of quality of living. The far insight of "economic growth" aims to minimize transaction opportunity costs by adopting an ecologically-centered approach, beyond the previous "hallowed status" of economic benefit centered approach, to give a way to integrated governance of land and other resource across different administrative levels in order to drive an increase of quality in economic growth sustainably. This more coordinated and robust approach will pay more considerations to regional characteristics to enhance both the quality of economic growth and the social wellbeing of urban and rural communities.

Furthermore, strong and effective institutions under a certain structure of the economy serve and guarantee the implementation of appropriate land use policies to support integrated land governance. Under the circumstance of climatic variation, comprehensive regional planning requires the integrated governance of resource across different departments and various administrative levels. From both natural and social science perspectives, systematic monitoring and assessment of environmental changes and economic performances provide robust evidence to further adjust the adaptation and regulation of climatic variation. In this complex and dynamic process, an integrated approach of land governance is the fundamental platform for transforming the management of eco-urbanization.

Both scientific findings and managerial measures reveal ecological intercorrelation of multiple factors among the ecosystem, land use/cover changes and climate changes to modulate the access of policy implementation, for re-pricing the economic value of natural resource, and reshaping individual behaviors of resource consumption. In the process of eco-urbanization, creative techniques, innovative ideas, and active entrepreneurship also play important roles. How to keep a green economy growing, while at the same time protecting the environment from severe degradation, will rely on advanced knowledge and engineering. At the micro-level, policies are not some institutions, or articles on paper, but a collective tendency of some customs and behaviors. For instance, the probability that Chinese peasants have higher increases in cultivated land at townships than at other administrative levels is because more households prefer to work in urban area for higher income, and more firms in the cities prefer to invest in the abandoned farm land for lower cost and higher priced agri-products that are close to cities. This is true in China's current urbanization process; however, it induces potential risks of land management due to unclear land contract rights. Without the perspective of integrated land governance, these kinds of issues will become more and more complex and probably endanger the fundamental law of land rights in China. It is highly unpredictable whether those people will fail to find a better job in the cities, and if so, will they go back to rural villages? Will it be highly likely that there is no land for their survivals? Therefore, the objective of eco-urbanization is to aim for better urban–rural coordinated development. We argue that an integrated approach of land governance is

the key to a set of solutions that underpin the complex process of eco-urbanization to approach the sustainability of both environmental conservation and economic development.

Acknowledgments: This research was financially supported by the International/Regional Cooperation and Exchange Program of National Natural Science Foundation (Grant No. 71561137002); the UK Economic and Social Research Council (Grant No. ES/N010698/1); the Key Project of National Natural Science Foundation (Grant No. 7153000125); and the China National Natural Science Funds for Distinguished Young Scholar (Grant No. 71225005).

Author Contributions: Zhan Wang conducted and performed the research, and wrote and revised the paper; Xiangzheng Deng designed the research, collected the data and revised the paper; and Cecilia Wong contributed to the design and revision of the paper.

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

References

1. Wang, Z.; Deng, X.; Wang, P.; Chen, J. Ecological intercorrelation in urban-rural development: An eco-city of China. *J. Clean. Prod.* **2016**. in press. [CrossRef]
2. Deng, X.; Huang, J.; Rozelle, S.; Uchida, E. Growth, population and industrialization, and urban land expansion of China. *J. Urban Econ.* **2008**, *63*, 96–115. [CrossRef]
3. Deng, X.; Huang, J.; Rozelle, S.; Uchida, E. Economic Growth and the Expansion of Urban Land in China. *Urban Stud.* **2010**, *47*, 813–843. [CrossRef]
4. Millennium Ecosystem Assessment. *Ecosystems and Human Well-Being*; Island Press: Washington, DC, USA, 2005; Volume 5.
5. Costanza, R. *Ecological Economics: The Science and Management of Sustainability*; Columbia University Press: New York, NY, USA, 1992.
6. Roseland, M. Dimensions of the eco-city. *Cities* **1997**, *14*, 197–202. [CrossRef]
7. De Jong, M.; Joss, S.; Schraven, D.; Zhan, C.; Weijnen, M. Sustainable–smart–resilient–low carbon–eco–knowledge cities; making sense of a multitude of concepts promoting sustainable urbanization. *J. Clean. Prod.* **2015**. [CrossRef]
8. Zaman, A.U.; Lehmann, S. The zero waste index: A performance measurement tool for waste management systems in a 'zero waste city'. *J. Clean. Prod.* **2013**, *50*, 123–132. [CrossRef]
9. De Angelis, D.L. Energy Flow, Nutrient Cycling, and Ecosystem Resilience. *Ecology* **1980**, 764–771. [CrossRef]
10. Berkes, F.; Folke, C.; Colding, J. *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*; Cambridge University Press: Cambridge, UK, 2000.
11. Lundberg, J.; Moberg, F. Mobile Link Organisms and Ecosystem Functioning: Implications for Ecosystem Resilience and Management. *Ecosystems* **2003**, *6*, 0087–0098. [CrossRef]
12. Yang, L.; Wang, Z.; Jin, G.; Chen, D.; Wang, Z. Geological risk assessment for the rapid development area of the Erhai Basin. *Phys. Chem. Earth Parts A/B/C* **2015**, *89*, 79–90. [CrossRef]
13. Liu, Y.; Li, Y. Environment: China's land creation project stands firm. *Nature* **2014**, *511*, 410. [CrossRef] [PubMed]
14. Joss, S. Eco-City Governance: A Case Study of Treasure Island and Sonoma Mountain Village. *J. Environ. Policy Plan.* **2011**, *13*, 331–348. [CrossRef]
15. Sikor, T.; Auld, G.; Bebbington, A.J.; Benjaminsen, T.A.; Gentry, B.S.; Hunsberger, C.; Upton, C. Global land governance: From territory to flow? *Curr. Opin. Environ. Sustain.* **2013**, *5*, 522–527. [CrossRef]
16. Foley, J.A.; DeFries, R.; Asner, G.P.; Barford, C.; Bonan, G.; Carpenter, S.R.; Helkowski, J.H. Global consequences of Land Use. *Science* **2005**, *309*, 570–574. [CrossRef] [PubMed]
17. Worm, B.; Barbier, E.B.; Beaumont, N.; Duffy, J.E.; Folke, C.; Halpern, B.S.; Sala, E. Impacts of Biodiversity Loss on Ocean Ecosystem Services. *Science* **2006**, *314*, 787–790. [CrossRef] [PubMed]
18. Jones, C.G.; Lawton, J.H.; Shachak, M. Positive and negative effects of organisms as physical ecosystem engineers. *Ecology* **1997**, *78*, 1946–1957. [CrossRef]
19. Wang, Z.; Deng, X.; Li, X.; Zhou, Q.; Yan, H. Impact analysis of government investment on water projects in the arid Gansu Province of China. *Phys. Chem. Earth Parts A/B/C* **2015**, *79*, 54–66. [CrossRef]
20. Kahneman, D.; Knetsch, J.L.; Thaler, R.H. Experimental Tests of the Endowment Effect and the Coase Theorem. *J. Political Econ.* **1990**, 1325–1348. [CrossRef]

21. McCloskey, D.N. The Rhetoric of Economics. *J. Econ. Lit.* **1983**, *21*, 481–517.
22. Lin, J.Y.; Liu, Z. Fiscal Decentralization and Economic Growth in China. *Econ. Dev. Cult. Chang.* **2000**, *49*, 1–21. [CrossRef]
23. Coase, R.H. The Institutional Structure of Production. *Am. Econ. Rev.* **1992**, 713–719.
24. Fu, B.; Wang, S.; Su, C.; Forsius, M. Linking ecosystem processes and ecosystem services. *Curr. Opin. Environ. Sustain.* **2013**, *5*, 4–10. [CrossRef]
25. Xu, J.; Yeh, A. Decoding Urban Land Governance: State Reconstruction in Contemporary Chinese Cities. *Urban Stud.* **2009**, *46*, 559–581. [CrossRef]
26. Paulino, E.T. The agricultural, environmental and socio-political repercussions of Brazil's land governance system. *Land Use Policy* **2014**, *36*, 134–144. [CrossRef]
27. Hilson, G. An overview of land use conflicts in mining communities. *Land Use Policy* **2002**, *19*, 65–73. [CrossRef]
28. Uchida, E.; Xu, J.; Rozelle, S. Grain for Green: Cost-Effectiveness and Sustainability of China's Conservation Set-Aside Program. *Land Econ.* **2005**, *81*, 247–264. [CrossRef]
29. Liang, Y.; Li, S.; Feldman, M.W.; Daily, G.C. Does household composition matter? The impact of the Grain for Green Program on rural livelihoods in China. *Ecol. Econ.* **2012**, *75*, 152–160. [CrossRef]
30. De Groot, R.S.; Alkemade, R.; Braat, L.; Hein, L.; Willemen, L. Challenges in integrating the concept of ecosystem services and values in landscape planning, management and decision making. *Ecol. Complex.* **2010**, *7*, 260–272. [CrossRef]
31. Swyngedouw, E.; Moulaert, F.; Rodriguez, A. Neoliberal Urbanization in Europe: Large-Scale Urban Development Projects and the New Urban Policy. *Antipode* **2002**, *34*, 542–577. [CrossRef]
32. Moomaw, R.L.; Shatter, A.M. Urbanization and economic development: A bias toward large cities? *J. Urban Econ.* **1996**, *40*, 13–37. [CrossRef] [PubMed]
33. Aide, T.M.; Grau, H.R. Globalization, migration, and Latin American ecosystems. *Science* **2004**, *305*, 1915–1916. [CrossRef] [PubMed]
34. Coy, M.; Pöhler, M. Gated communities in Latin American megacities: Case studies in Brazil and Argentina. *Environ. Plan. B Plan. Des.* **2002**, *29*, 355–370. [CrossRef]
35. World Bank. Available online: http://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS (accessed on 5 September 2016).
36. Davis, J.C.; Henderson, J.V. Evidence on the political economy of the urbanization process. *J. Urban Econ.* **2003**, *53*, 98–125. [CrossRef]
37. Zheng, S.; Kahn, M.E.; Sun, W.; Luo, D. Incentives for China's Urban Mayors to Mtigate Pollution Externalities: The Role of the Central Government and Public Environmentalism. *Reg. Sci. Urban Econ.* **2014**, *47*, 61–71. [CrossRef]
38. Liu, Y.; He, S.; Wu, F.; Webster, C. Urban villages under China's rapid urbanization: Unregulated assets and transitional neighbourhoods. *Habitat Int.* **2010**, *34*, 135–144. [CrossRef]
39. Santamouris, M. Cooling the cities—A review of reflective and green roof mitigation technologies to fight heat island and improve comfort in urban environments. *Sol. Energy* **2014**, *103*, 682–703. [CrossRef]
40. Deng, X.; Bai, X. Sustainable Urbanization in Western China. *Environ. Sci. Policy Sustain. Dev.* **2014**, *56*, 12–24. [CrossRef]
41. Li, F.; Wang, R.; Paulussen, J.; Liu, X. Comprehensive concept planning of urban greening based on ecological principles: A case study in Beijing, China. *Landsc. Urban Plan.* **2005**, *72*, 325–336. [CrossRef]
42. Pataki, D.E.; Carreiro, M.M.; Cherrier, J.; Grulke, N.E.; Jennings, V.; Pincetl, S.; Zipperer, W.C. Coupling biogeochemical cycles in urban environments: Ecosystem services, green solutions, and misconceptions. *Front. Ecol. Environ.* **2011**, *9*, 27–36. [CrossRef]
43. Kenworthy, J.R. The eco-city: Ten key transport and planning dimensions for sustainable city development. *Environ. Urban.* **2006**, *18*, 67–85. [CrossRef]
44. McCarty, J.P. Ecological Consequences of Recent Climate Change. *Conserv. Biol.* **2001**, *15*, 320–331. [CrossRef]
45. Walther, G.R.; Post, E.; Convey, P.; Menzel, A.; Parmesan, C.; Beebee, T.J.; Bairlein, F. Ecological responses to recent climate change. *Nature* **2002**, *416*, 389–395. [CrossRef] [PubMed]
46. Vitousek, P.M. Beyond Global Warming: Ecology and Global Change. *Ecology* **1994**, *75*, 1861–1876. [CrossRef]

47. Huang, W.; Bruemmer, B.; Huntsinger, L. Incorporating measures of grassland productivity into efficiency estimates for livestock grazing on the Qinghai-Tibetan Plateau in China. *Ecol. Econ.* **2016**, *122*, 1–11. [CrossRef]
48. Chen, H.; Zhu, Q.; Peng, C.; Wu, N.; Wang, Y.; Fang, X.; Kang, X. The impacts of climate change and human activities on biogeochemical cycles on the Qinghai–Tibetan Plateau. *Glob. Chang. Boil.* **2013**, *19*, 2940–2955. [CrossRef] [PubMed]
49. Du, F. Ecological Resettlement of Tibetan Herders in the Sanjiangyuan: A Case Study in Madoi County of Qinghai. *Nomadic Peoples* **2012**, *16*, 116–133. [CrossRef]
50. Liu, J.; Li, S.; Ouyang, Z.; Tam, C.; Chen, X. Ecological and socioeconomic effects of China's policies for ecosystem services. *Proc. Natl. Acad. Sci. USA* **2008**, *105*, 9477–9482. [CrossRef] [PubMed]
51. York, R.; Rosa, E.A. Key Challenges to Ecological Modernization Theory Institutional Efficacy, Case Study Evidence, Units of Analysis, and the Pace of Eco-Efficiency. *Organ. Environ.* **2003**, *16*, 273–288. [CrossRef]
52. Wang, Z.; Deng, X.; Chen, J. Impacts of sparing use of water on farmer income of China. *Phys. Chem. Earth Parts A/B/C* **2015**, *89*, 18–24. [CrossRef]
53. Zheng, S.; Cao, J.; Kahn, M.E.; Sun, C. Real Estate Valuation and Cross-Boundary Air Pollution Externalities: Evidence from Chinese Cities. *J. Real Estate Financ. Econ.* **2014**, *48*, 398–414. [CrossRef]
54. Soytas, U.; Sari, R. Energy consumption and GDP: Causality relationship in G-7 countries and emerging markets. *Energy Econ.* **2003**, *25*, 33–37. [CrossRef]
55. Belke, A.; Dobnik, F.; Dreger, C. Energy consumption and economic growth: New insights into the cointegration relationship. *Energy Econ.* **2011**, *33*, 782–789. [CrossRef]
56. Richmond, A.K.; Kaufmann, R.K. Is there a turning point in the relationship between income and energy use and/or carbon emissions? *Energy Econ.* **2006**, *56*, 176–189. [CrossRef]
57. Arrow, K.; Bolin, B.; Costanza, R.; Dasgupta, P.; Folke, C.; Holling, C.S.; Pimentel, D. Economic Growth, Carrying Capacity, and the Environment. *Ecol. Appl.* **1996**, 13–15. [CrossRef]
58. Max-Neef, M. Economic growth and quality of life: A threshold hypothesis. *Energy Econ.* **1995**, *15*, 115–118. [CrossRef]
59. Schumacher, I. The endogenous formation of an environmental culture. *Eur. Econ. Rev.* **2015**, *76*, 200–221. [CrossRef]
60. Ciriacy-Wantrup, S.V.; Bishop, R.C. Common property as a concept in natural resources policy. *Nat. Resour. J.* **1975**, *15*, 713.
61. Agrawal, A.; Gibson, C.C. Enchantment and Disenchantment: The Role of Community in Natural Resource Conservation. *World Dev.* **1999**, *27*, 629–649. [CrossRef]
62. Isham, J.; Woolcock, M.; Pritchett, L.; Busby, G. The Varieties of Resource Experience: Natural Resource Export Structures and the Political Economy of Economic Growth. *World Bank Econ. Rev.* **2005**, *19*, 141–174. [CrossRef]
63. Sachs, J.D.; Warner, A.M. The curse of natural resources. *Eur. Econ. Rev.* **2001**, *45*, 827–838. [CrossRef]
64. Kalnay, E.; Cai, M. Impact of Urbanization and Land-Use Change on Climate. *Nature* **2003**, *423*, 528–531. [CrossRef] [PubMed]
65. Lal, R. Soil degradation by erosion. *Land Degrad. Dev.* **2001**, *12*, 519–539. [CrossRef]
66. Deng, X.; Su, H.; Zhan, J. Integration of Multiple Data Sources to Simulate the Dynamics of Land Systems. *Sensors* **2008**, *8*, 620–634. [CrossRef]
67. Deng, X.; Jiang, Q.O.; Zhan, J.; He, S.; Lin, Y. Simulation on the dynamics of forest area changes in Northeast China. *J. Geogr. Sci.* **2010**, *20*, 495–509. [CrossRef]
68. Singh, R.B.; Grover, A.; Zhan, J. Inter-Seasonal Variations of Surface Temperature in the Urbanized Environment of Delhi Using Landsat Thermal Data. *Energies* **2014**, *7*, 1811–1828. [CrossRef]
69. Deng, X.; Zhang, F.; Wang, Z.; Li, X.; Zhang, T. An Extended Input Output Table Compiled for Analyzing Water Demand and Consumption at County Level in China. *Sustainability* **2014**, *6*, 3301–3320. [CrossRef]
70. Jin, Q.; Deng, X.; Wang, Z.; Shi, C.; Li, X. Analysis and Projection of the Relationship between Industrial Structure and Land Use Structure in China. *Sustainability* **2014**, *6*, 9343–9370. [CrossRef]
71. Jessop, B. Governance and Metagovernance: On Reflexivity, Requisite Variety and Requisite Irony. In *Governance as Social and Political Communication*; Department of Sociology, Lancaster University: Lancaster, UK, 2003; pp. 101–116.

72. Jessop, B. From Governance to Governance *Failure* and from Multi-Level Governance to *Multi-Scalar Meta*-Governance. In *The Disoriented State: Shifts in Governmentality, Territoriality and Governance*; Springer: Dordrecht, The Netherlands, 2009; pp. 79–98.
73. Qian, H.; Wong, C. Master Planning under Urban–Rural Integration: The Case of Nanjing, China. *Urban Policy Res.* **2012**, *30*, 403–421. [CrossRef]
74. Liu, J. *The Macro Investigation and Dynamic Research of the Resource and Environment in China*; Science and Technology Press: Beijing, China, 1996; pp. 158–188.
75. Liu, J.; Liu, M.; Zhuang, D.; Zhang, Z.; Deng, X. Study on spatial pattern of land-use change in China during 1995–2000. *Sci. China Ser. D Earth Sci.* **2003**, *46*, 373–384. [CrossRef]
76. Deng, X.; Wang, Z.; Zhao, C. Economic Evolution in China Ecologically Fragile Regions. *J. Econ. Surv.* **2016**, *30*, 552–576. [CrossRef]
77. Williamson, O.E. Transaction-Cost Economics: The Governance of Contractual Relations. *J. Law Econ.* **1979**, *22*, 233–261. [CrossRef]
78. Ostrom, E. Collective Action and the Evolution of Social Norms. *J. Econ. Perspect.* **2000**, *14*, 137–158. [CrossRef]
79. Beckley, T.M.; Stedman, R.C.; Wallace, S.M.; Ambard, M. Snapshots of What Matters Most: Using Resident-Employed Photography to Articulate Attachment to Place. *Soc. Nat. Resour.* **2007**, *20*, 913–929. [CrossRef]
80. Nepstad, D.; McGrath, D.; Stickler, C.; Alencar, A.; Azevedo, A.; Swette, B.; Armijo, E. Slowing Amazon deforestation through public policy and interventions in beef and soy supply chains. *Science* **2014**, *344*, 1118–1123. [CrossRef] [PubMed]
81. Di Castri, F.; Hadley, M. Enhancing the credibility of ecology: Interacting along and across hierarchical scales. *GeoJournal* **1988**, *17*, 5–35. [CrossRef]
82. Schonewald-Cox, C.M.; Bayless, J.W. The boundary model: A geographical analysis of design and conservation of nature reserves. *Biol. Conserv.* **1986**, *38*, 305–322. [CrossRef]
83. Alfsen-Norodom, C. Urban Biosphere and Society: Partnership of Cities—Introduction. *Ann. N. Y. Acad. Sci.* **2004**, *1023*, 1–9. [CrossRef] [PubMed]