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Environmental Entitlements: Institutional Influence on Mangrove Social-Ecological Systems in Northern Vietnam

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Academic Editor: Damien Giurco

Received: 29 September 2015 / Accepted: 23 November 2015 / Published: 30 November 2015

Abstract: Environment and development issues are complex and interdependent. Institutions underpinning state, private sector and civil society actions at various levels must address complexity to ensure social-ecological system integrity. However, responses often operate at only one governance level, with limited interactions with other levels, restricting their ability to support communities who depend on natural resources for their livelihoods. This paper explores institutional factors influencing household entitlements to mangrove system provisioning goods on Vietnam's northern coast. The environmental entitlements framework is used to identify: (1) current formal and informal institutional structures relating to mangrove systems; (2) the influence of state, private sector and non-governmental organisation actors at various levels; and (3) how actions occurring at and among various levels of governance shape mangrove system entitlements at the local level. Employing a case study approach, this research utilises qualitative methods and a multi-level governance approach to understand prevailing institutional contexts. Results indicate that reforms occurring within weak regulatory frameworks led to the concentration of power at the meso level, reducing the endowments of marginalized households. Market forces facilitated inequality and environmental degradation, negatively impacting household entitlements. Finally, a lack of formally recognised civil society constrained household capabilities to participate in mangrove planning. Mangrove dependent households must be integrated into mangrove planning at the local level, as processes at higher institutional levels affect household environmental entitlements and threaten

sustainable outcomes. Ensuring views from the local level feed into the multi-level governance process is vital.

Keywords: natural resource management; coastal; wetland; sustainable development; multi-level governance; capabilities

1. Introduction

Mangrove systems are highly productive and deliver multiple benefits to humans [1]: sequestering carbon to contribute to global climate regulation [2]; significantly reducing dike maintenance and coastal protection costs for national governments [3]; protecting coastal localities from storms and erosion [4]; regulating local water quality [5]; and providing ecosystem provisioning goods such as fish, shrimp, crustaceans and molluscs to support the livelihoods of coastal households [6]. However, mangrove systems are being rapidly degraded and lost due to human activities such as urbanisation, industrialisation, infrastructure development, and natural resource extraction [4]. The conversion of mangrove system areas to large-scale, intensive commercial aquaculture has been identified as a particularly significant threat to mangrove systems [5], undermining the livelihoods of communities dependent on mangrove system resources for their survival [7].

Human-environment interactions, including in mangrove systems, function as integrated social-ecological systems (SES) [8]. Governance decisions and actions interact with environmental processes, and are channelled through and influenced by institutions at and across various levels (*i.e.*, international, national, provincial, district and local) [9]. Governance refers to “...*all processes of governing, whether undertaken by a government, market or network, whether over a family, tribe, formal or informal organization or territory and whether through laws, norms, power or language*” ([10] p. 1). It relates to “...*the processes of interaction and decision-making among the actors involved in a collective problem that lead to the creation, reinforcement, or reproduction of social norms and institutions*” ([11] p. 405). Institutions are defined by North ([12] p. 97) as “...*humanly devised constraints that structure political, economic and social interactions*”. In an SES frame, institutions operate at multiple levels of SES governance [13]. Hence, governance indicates an absence of coercive state power in SES management and is defined as the establishment, reaffirmation or change of institutions to resolve conflicts over environmental resources [14].

As global structures and processes increase the complexity of SES governance, involving state, private sector, and civil society actors, with differing interests, claims and influence [15], efforts towards sustainable SES governance face many institutional challenges [16]. SES planning is typically developed and operates at the national level, failing to sufficiently recognise that such systems involve multiple actors operating at and between various institutional levels [17]. These institutional structures and processes shape how natural resource dependent communities (NRDC) are affected by and respond to change [18], and can undermine the ability of households in NRDC to access the resources that underpin their livelihoods [19]. Hence, to achieve the sustainable management of mangrove systems and support local livelihoods, SES planning should not focus on one particular level, but seek

to understand the influence of broader institutional structures and processes and the wide range of stakeholders that operate at different levels of governance [20].

Despite growing acknowledgement of the importance of multi-level institutional structures and processes for sustainable mangrove SES governance, how such structures and processes shape the differentiation of natural resource access within NRDC remains understudied [21]. There is an urgent need for case study research in areas faced with the interconnected challenge of increased human activity and degradation in order to reconcile the goals of development and conservation [22]. Mangrove systems therefore offer an important and timely case study focus. Vietnam provides a highly relevant context for this research, having undergone significant social, economic, and environmental change of its mangrove SES [7]. Vietnam's transition from a highly centralised planned economy to a socialist-orientated market economy was initiated in 1986 (*Đổi Mới*). During this time, economic reforms were implemented while the Communist Party retained political control. Reforms included: devolution of land management from centralised collectives to households; decentralisation of land allocation decision making to local government; and market liberalisation. Although the transition has fostered significant economic gains, a set of intractable social and environmental issues, such as growing inequality and natural resource degradation and loss, remain [23]. Vietnam's transition has exposed its mangrove systems to pressures from various levels, and facilitated the rapid conversion of mangrove system land to commercial aquaculture [24]. Vietnam has lost 69% of its 269,000 hectares of mangrove forests held in 1980, with an estimated 77% of this loss due to aquaculture [25]. Mangrove systems along the northern coastline of Vietnam help protect coastal areas from annual typhoons that can be very destructive and threaten lives and livelihoods. Some may bring no more than heavy rains and strong winds but others can cause intense flooding, severe landslides, claim thousands of lives and cause millions of dollars in damage. Studying the implications of Vietnam's transition on the entitlements of mangrove system resource dependent communities (MRDC) from an institutional perspective can enhance insights into the interdependencies between human activity and mangrove goods and services.

Institutional structures and processes operating at and among various levels create a range of fundamental economic, ecological, social and political challenges for the sustainable governance of mangrove systems. Such challenges affect sustainable governance at the local level by shaping access to the natural resources communities depend on for their livelihoods and survival. This paper aims to understand how institutional process and structures occurring at multiple levels of governance allow particular individuals and groups to access differing entitlements to mangrove system resources, using northern Vietnam as a case study. To do this, the paper identifies: (1) current formal and informal institutional structures relating to mangrove systems; (2) the influence of state, private sector and non-governmental organisation actors at various levels; and (3) how actions occurring at and among various levels of governance shape mangrove system entitlements at the local level. We argue that political and economic reforms implemented within a weak formal institutional framework have reinforced pre-existing power structures and concentrated wealth among local elites, negatively impacting the mangrove entitlements of marginalised households. The informal institutional setting within which reforms are implemented can further constrain the capability of marginalised households to participate in mangrove management decisions, which is necessary for sustainable governance of mangrove systems.

The next sections outline central concepts related to multi-level governance of social-ecological systems and environmental entitlements, followed by details of the research design and process. The formal and informal institutional settings relating to mangrove system governance are then explored, followed by the identification and role of state, private sector and civil society actors within governance processes, and the implications for household mangrove system entitlements. Lessons from such insights are then discussed, leading to the presentation of conclusions to inform future mangrove system governance.

Central Concepts

It is increasingly recognised that ecosystems may avoid degradation and loss if there is social capacity to respond effectively to change [13]. However, the multi-level character of SES suggests that state regulation and private ownership are inadequate and lack the capacity to deal with such complexity [20]. As awareness of the complexity and interconnectedness of SES increases, institutions will play a vital role in the success of governance solutions [26]. Institutions can be both formal and informal, “...*formal institutions are openly codified, in the sense that they are established and communicated through channels that are widely accepted as official...informal institutions are socially shared rules, usually unwritten, that are created, communicated, and enforced outside of officially sanctioned channels*” ([27] p. 727). Responses to SES dynamics are formed partly through institutions that shape relations among and between multiple levels of governance [28]. Institutions emanate from agreements and debates occurring over time and hence carry a bias from these previous negotiations, perceptions and power relations [29]. This process is referred to as “institutionalisation” [30]. Subsequently, institutions comprise a degree of resistance to change which can constrain action [31]. Furthermore, institutions enable and maintain the involvement of certain actors and practices, they can also exclude or constrain others [28]. Collaborative approaches to natural resource governance incorporate multiple viewpoints and resources that are leveraged through the collaborative process, fostering more flexible and responsive institutions and actions for managing conflicts, building trust, pooling resources, building capacity and sustaining action [32].

Polycentric governance has emerged as a collaborative approach to analyse those institutions that shape decision making among multiple actors, authorities, organisations and sectors at multiple scales of governance [33]. This is particularly important for biologically diverse systems such as mangroves, where human-environment interactions are little understood [34]. Polycentric systems are complex, adaptive, non-hierarchical systems that incorporate local and scientific knowledge, utilising the complementarities to overcome the limitations and weakness of the other [33]. Such collaborative governance arrangements (when individuals from differing groups provide inputs to produce a good or service [35]) have been presented as more effective, transparent and representative because citizens can influence governance at multiple levels of authority [36,37]. Hence, polycentric governance is a multi-level approach with the potential to tackle complex multi-scale challenges due to its focus on cross-level interactions [38].

Entitlements refer to the social, political and economic processes that institutionalise resource rights, access and distribution in ways that are often path-dependent, creating differentiated access and control over resources within communities [28]. Sen [39] defines entitlements as “...*the set of*

alternative commodity bundles that a person can command in a society using the totality of rights and opportunities that he or she faces” (p. 497). A person’s “entitlement set” is the full range of goods and services that they can acquire by converting their “endowments” (*i.e.*, an individual’s initial ownership of, for example, land, capital or labour) through processes of “mapping”. Mapping describes the relationship between the initial endowment set and the resulting entitlement set. Such relations may be based on such processes as production, trade, inheritance or transfer. Entitlements, in turn, enhance people’s capabilities. Nussbaum [40] describes one aspect of capabilities as the ability to control one’s environment through effective participation in the political decisions that govern one’s life: *i.e.*, having the right of political participation, and protections of free speech and association. Examining entitlements can provide insights into how people gain divergent entitlements from their initial endowments, and so improve their well-being or capabilities. Hence, institutions operating at multiple levels of governance shape household entitlements to natural resources [41].

However, entitlement approaches have been criticized for: (1) focusing on how endowments (assumed to be simply given) are transformed into entitlements, with limited attention to how people gain endowments [42]; and (2) giving priority to individuals’ command over resources through market channels, backed up by formal legal property rights [43]. Hence, the entitlement approach may be inadequate in contexts where the relationship between individuals and resources is mediated by non-market and/or informal institutions. Analysis is required that recognizes the importance of non-market institutions in determining entitlements [43]. The environmental entitlements framework presented by Leach *et al.* [42] is used here to address this challenge by considering how institutional structures and processes at multiple scales differentiate the command of environmental goods and services that are instrumental to local livelihoods within MRDC. The framework has been successfully used to examine: co-management in marine ecosystems of Chile [44]; gender relations regarding coastal natural resources in Tanzania [45]; land rights and forest resources in South Africa [46]; empowerment and institutions in management of fisheries in Uganda [47]; and forest devolution and forest resources in Vietnam [48].

The ability of households to access the resources necessary to support their livelihoods is shaped through their environmental entitlements, *i.e.*, the ability of households to gain legitimate control, access and use of the ecosystem services. Environmental entitlements refer to “...*alternative sets of utilities derived from environmental goods...over which social actors have legitimate effective command and which are instrumental in achieving well-being*” ([42] p. 233). The environmental entitlements approach provides a multi-level approach for studying the role of diverse and dynamic institutions operating at macro, meso and micro levels of SES. Figure 1 illustrates the environmental entitlements framework, where an undifferentiated “environment” is disaggregated into specific environmental goods, and the relations between and within a given “community” is made up of differentiated social actors. Social actors obtain capabilities by acquiring legitimate, effective command over resources by gaining entitlements through processes of endowment mapping. The framework centres on the dynamic mapping processes that underlie each of the static endowment, entitlement and capability sets, which are themselves mediated by numerous types of institution occurring at the macro, meso and micro levels. Figure 1 deviates from the original framework presented by Leach *et al.*, at this point, in that the institutions that shape endowments, entitlements and capabilities are not considered distinct, but rather linked phenomena that shape access to and control

over local resources. This reflects Ostrom's [26] observation that: "...appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises" (p. 90). The relationships between and among institutional levels are a salient influence on which actors gain access to and control over natural resources, and whose actions cumulatively change and shape the landscape over time (represented by feedback loops). Hence, environmental entitlements is an approach for explaining how the consequences of environmental change in general, and access to and control over natural resources in particular, are socially differentiated within communities [42].

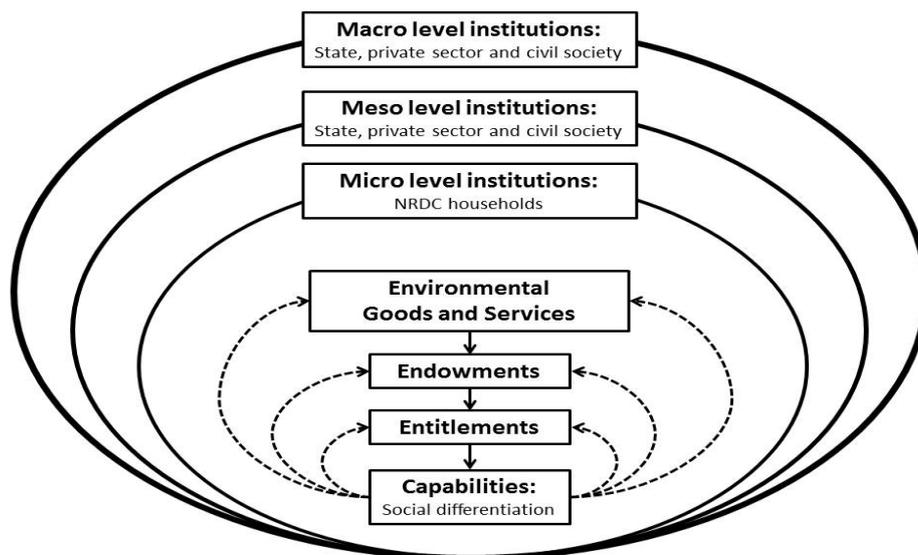


Figure 1. The Environmental Entitlements Framework (EEF). Adapted from Leach *et al.* [42].

Understanding what these interactions mean for environmental entitlements will inform mangrove management and institution building in order to support mangrove conservation, as well as the livelihoods of MRDC. In order to achieve this, this research uses an integrated and holistic approach, drawing on the environmental entitlements framework and applying a qualitative approach to a case study setting to understand the social, political, institutional and environmental aspects driving the institutional structures and processes of mangrove system governance.

2. Methods

Research Design

Data collection was conducted between April 2011 and August 2013 in three coastal communities in northern Vietnam: Giao Xuan (Nam Dinh province); Da Loc (Thanh Hoa province); and Dong Rui (Quang Ninh province) (Figure 2). For the purpose of this study, a community is defined as a subsection of a commune, representing a spatially and historically distinct socio-economic impact area of a given mangrove system [49]. Study communities were identified following meetings, discussions and field visits with in-country partners, and selected based on significant mangrove presence contributing to local livelihoods, degree of aquaculture development, livelihood activities (*i.e.*, rural), geographic location (*i.e.*, northern coast), and climatic aspects. The three selected communities

represent mangrove systems that are distinct, geographically separate and with different histories. All study sites were characteristic of intertidal wetlands, where communities had some level of access to adjacent mangrove systems. Each mangrove system comprised the interdependent components of trees and intertidal mudflat areas from which communities acquired provisioning goods. In all three communities, MSPG refer to the wild fish, clams, shrimp, crab and other shoreline animals collected from mangrove system commons. Regarding the environmental entitlements framework, the macro level refers to national and international level institutions; the meso level encompasses institutions operating below national institutions and above households; and the micro level refers to household institutions.

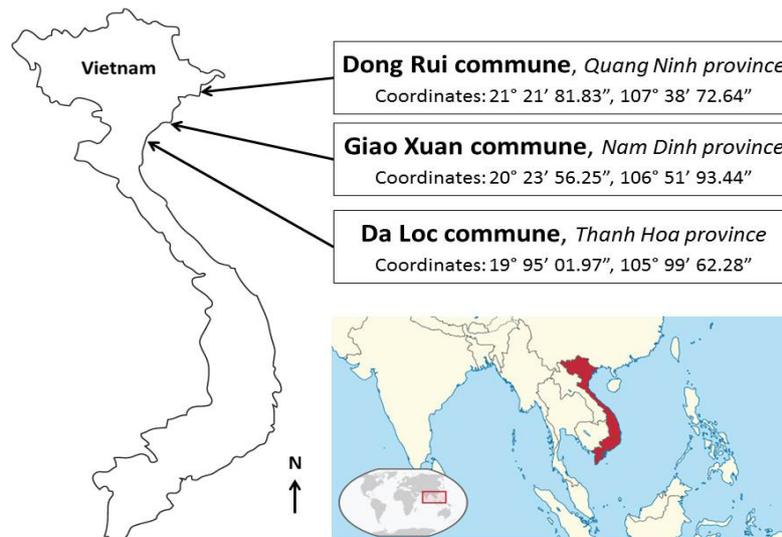


Figure 2. Study site locations and coordinates (*source: modified from Wikipedia [50]*).

Giao Xuan has a highly developed clam aquaculture sector which was established in the early 1990s. The sector was facilitated and supported by emerging trade connections between local households and aquaculture investors from China following market liberalisation (in 1986). Giao Xuan is now one of the largest producers of clams in Vietnam, supplying both domestic and international markets. Aquaculture farms are situated in the mudflat area located beyond the mangrove forest and covering the full extent of the coastline adjacent to the community. In Da Loc the clam aquaculture sector is in the initial stages of development, having been started in 2010 by local households who observed the success of neighbouring communities' clam aquaculture ventures. They have little experience, knowledge or support but productivity is rising quickly and domestic markets are rapidly growing. As with Giao Xuan, the aquaculture farms are situated in the mudflat area located beyond the mangrove forest and cover the full extent of coastline adjacent to the community. Dong Rui is situated on an island archipelago. The area experienced large scale, intense and highly productive commercial shrimp and fish aquaculture growth during the late 1980s and early 1990s, in adjacent areas surrounding the community on all sides. These ventures were carried out by investors external to the local area, who brought their own labour force to work in the fields. Following an initial 2–3 years of high productivity, the sector collapsed due to mismanagement. This resulted in severe environmental damage and the abandonment of aquaculture fields. Considering the minor impact on community livelihood opportunities and social networks resulting from the establishment of aquaculture, and also the time elapsed since the collapse of the sector, aquaculture is considered to be at a low level in this community.

To assist familiarisation with the specific local contexts, histories and issues surrounding mangrove systems in each study site, pilot studies were conducted for 2–3 days at the start of the first visit to each community. These comprised transect walks through mangrove system corridors with local authority and non-governmental organisation (NGO) representatives, participant observations with households collecting MSPG, and informal conversations with the wider community. A qualitative approach was taken to data collection and analysis through a series of semi-structured interviews (Table 1). Household semi-structured interview respondents were selected from survey respondents in a wider research project [7], using purposive sampling to ensure a balance between broad categories of households based on wealth, gender and age [19]. Semi-structured interview questions were informed by pilot studies and tailored to each context, and collected data on the influence of institutional change on household MSPG entitlements [51]. Expert semi-structured interview respondents were selected using purposive sampling, with the help of in-country key informants to identify the major state, NGO and university stakeholders in the field of mangrove governance and research. The time span considered in the interviews was limited to the period 1975–2012. This covers the post-reunification period, encapsulating the collectivised farming era and subsequent market liberalisation, devolution of land management, and decentralisation of land allocation decisions: significant events in setting the boundaries of household access to mangrove systems. The “positioning” of the researcher and translator in cross-cultural research can influence how interviews and data evolve. The research also required translation of questions from English-Vietnamese and of responses from Vietnamese-English. As such, interview schedules were formulated with input of in-country colleagues in a way that was familiar to the interviewees [52] to develop a predefined protocol to guide discussion [53] and translators with experience in environment and development issues were employed [54,55].

Table 1. Break-down of semi-structured interviews conducted.

| Actor | Giao Xuan | Da Loc | Dong Rui | National | International | Total |
|--------------|------------------|---------------|-----------------|-----------------|----------------------|--------------|
| Donor | - | - | - | - | 2 | 2 |
| NGO | 1 | 1 | 1 | 1 | 2 | 6 |
| State | 4 | 3 | 4 | 3 | - | 14 |
| University | - | - | - | 2 | - | 2 |
| Household | 10 | 10 | 10 | - | - | 30 |
| Total | 15 | 14 | 15 | 6 | 4 | 54 |

To identify formal and informal institutions (objective one), internet searches and secondary data from international NGOs and donors, the state, national NGOs, and academic respondents were used to purposefully select key formal institutions (openly codified, established and communicated through official channels). These included organisations, policies, regulations, reports and documents relating to mangrove system endowments (forests, wetlands, and fisheries). To assess awareness of the integrated nature of mangrove SES within these formal institutional structures, key official documents and organisations were examined through processes of thematic analysis [56] to understand the coherence and interaction of formal arrangements, as embedded within policy documents and institutional structures [57]. Informal institutions were first identified through literature searches and by examining instances in which similar formal rules produced divergent outcomes, and where stable patterns of behaviour did not correspond with formal rules [12]. This was achieved by: determining

interview respondents' shared expectations and mutual understandings of formal rules; defining the socio-economic impact area of mangrove systems; and ascertaining how informal rules are enforced and managed, such as through gossip, ostracism, hostility or other displays of social disapproval [27]. Extensive time spent in each study site between April 2011 and August 2013 facilitated understanding of the wider context within which informal institutions operate.

To achieve objective two, semi-structured interviews with all respondents were used to identify how key state, private sector and civil society actors have influenced household entitlements and entitlement mapping related to MSPGs. Expert interviews with state, private sector, civil society and university stakeholders sought to elucidate the changing roles and influences in the management of mangrove systems since the implementation of devolution, decentralisation and market reforms. Household interviews then sought to reveal how the changes identified in expert interviews have impacted households' abilities to convert household endowments into MSPG entitlements. To achieve objective three, semi-structured interviews with households and stakeholders were used to ascertain how formal structures, informal arrangements, and key actors, had affected household MSPG entitlements. Interviews with state, private, NGO and university respondents sought to ascertain how formal and informal structures had influenced the ability of actors external to the state to influence policy and regulation decisions relating to mangrove systems since economic reform. Interviews with households sought to understand changes in how state, private sector and civil society actors and informal structures had affected their ability to influence and/or participate in decisions relating to MSPGs.

Analysis of data was iterative, initially involving descriptive analysis to log trends and patterns in preliminary data collected during pilot studies in each commune. More detailed analysis was conducted as data accumulated. Interviews were coded under themes relating to endowments, entitlements and capabilities [58,59]. Themes were sub-categorised according to the influence of state, private sector and civil society actors, and informal institutions, in determining household access to MSPG. This facilitated identification of changes that had played a major role in household access to MSPG. Any conflicts or contradictions occurring in the data were either resolved by validation with data collected from respondents across household categories and stakeholder groups, or were explored further to ascertain whether conflict or consensus was observed. This resulted in a cyclical process culminating in inductive interpretation and explanation of results as institutional data was positioned within the developing picture of the socio-economic, political and environmental context.

3. Results

3.1. Formal and Informal Institutional Arrangements Relating to Mangrove SES Governance

This section identifies the current formal and informal institutional mechanisms across and within levels that shape mangrove SES governance and household MSPG entitlements.

3.1.1. Formal Institutions

Differences in mangrove system endowments derive largely from variations in statutory rights [60] and land use regulations [61]. In Vietnam, the same laws and regulations that govern terrestrial forests apply to mangrove forests, with the primary statutory laws underpinning the rights and duties for

mangrove forest stakeholders being: the Land Law 1993; the Forest Use and Development Law (FPDL) 2004; and the Grassroots Democracy Decree 1998.

Forest Policy

Until the mid-1980s, forestry policy was characterized by centralized State control and forests were deemed national assets owned by the State. State Forest Enterprises (SFE) and other State organizations were in control of 70% of forest land [62]. However, corruption in the forestry sector, a lack of effective monitoring and enforcement of legislation and policies, and a lack of incentives for local people to conserve and sustainably manage forest resources stemmed from the institutional problems associated with centralised state ownership [63]. Thus, state ownership of forest resources led to *de jure* state property but *de facto* open-access [64], and poor management of forests by SFE resulted in severe forest degradation and loss [65]. This was disastrous for the millions of people dependent on forest products for their livelihoods [66]. Local people's interest and insights were not taken into account in forest management, and an inadequate policy framework led to confusion among actors regarding forest endowments and conflicts between local resource users and state forest organizations, such as state-owned forestry companies and forest rangers [63,66]. The unequal distribution of land endowments emanated from the appropriation of land by farmers, causing intense conflict over forest rights and boundaries among divergent actors [63].

The 1986 “*Đổi Mới*” economic reforms led to the development of the “Socialist-oriented market economy”, bringing to an end the push for collectivisation and the exclusive commune cooperatives on agriculture and forestry [67]. After the initial success of “*Đổi Mới*”, the legal framework of land tenure changed further, devolving from State-based to society based management. Devolution aimed to address institutional problems, which were identified as the major reason behind forest loss and degradation [68], by increasing the power of local people by way of legal acts [69] and institutional changes [70]. In 1991, supported by the IUCN and the United Nations Development Program (UNDP), the government released an important report highlighting forest loss and degradation. The report argued that “*the most important issue in Vietnam is protection*” ([71] p. 91), and that “*without effective support from external sources Vietnam will not be able to maintain a sufficient base for the threatened species or its natural habitat*”.

The Vietnamese government also passed the Law on Forest Development and Protection in 1991, under which it shifted focus from forest production to forest conservation, with positive consequences for household mangrove SES endowments. Under the 1991 Law on Forest Development and Protection, forests are classified into three categories: special-use; protection; and production. Special Use Forest is primarily used for preserving the natural form of national forest ecosystems; protecting ecosystems, plant and animal diversity, and preserving historic, cultural and scenic sites. Protection forest is primarily used for watershed and environmental protection, and to protect against damage by wave, wind and sand. These two categories are under control of State Management Boards. The third category of forest: production forest, is mainly used as a source of wood and other forest products, which are under the management of the SFE. This forest category can be exploited for commercial purposes and to contribute to socio-economic development [63]. Production forests are allocated by

central government and managed by SFEs (now called forestry companies) who are legislatively responsible for the socio-economic development activities in and around the forests.

The 1991 Forestry Law defines the legal opportunities for forest land allocation and the leasing of forests (*i.e.*, endowment) to individuals, households, management boards, economic organizations and communities. However, when forest land is allocated to communities, they “...are not allowed to divide forests among their members and cannot convert, transfer, donate, lease, mortgage, provide guarantee or contribute business capital with, the value of the use rights over assigned forests” (Art. 30(2)(e), Law No. 29/2004) [72]. Protection and less-restricted production forest can also be allocated to households and individuals for long-term use. When forest is allocated to households, they receive a “red book” forest land use title for up to 50 years, with a bundle of rights consisting of rights of use, transfer, lease, inheritance and mortgage [73]. The Law reflects the state policy of: investing in, encouraging and supporting forest protection and development; and expanding the market for forestry products and insuring plantation forest [74].

In 1993 the Vietnamese government strengthened the special-use forest system to meet obligations under the United Nations Convention on Biological Diversity (UNCBD) and the Ramsar Convention by increasing the total surface area of protected areas to two million hectares [75]. Under the UNCBD, a fundamental principle of the programme of work for Article 8(j) [76] has been the participation of local communities in the work of the Convention. The government signed the UNCBD in 1995 and implemented the National Biodiversity Conservation Strategies in 1999. Forestry sectors have integrated conservation and sustainable use into national laws, policies, and programs and the national strategy. The National Target Program for Forestry (NTPF) (1998–2010), also known as the 5 Million Hectare Reforestation Program 661, aimed to conserve biodiversity, eradicate hunger, eliminate poverty and develop the national economy. However, the area of mangrove forest declined during this period from approximately 233,000 ha to 140,000 ha [77]. The remaining mangrove forests were allocated as: 13% special use; 55% protection; and 31% production. Mangrove forests are predominantly held by four major stakeholders: management boards (51%), commune People’s Committees (29%), private companies (10%), and households and communities (10%). Hence, mangrove forest tenure is largely vested in the State, through special-use and protection forests that are primarily governed by management boards and Commune People’s Committees (CPC). Mangrove system areas in all three study sites were either under the control of CPC, whom subsequently allocated much of the area to households. Nevertheless, in recognition of the limited capacity of the state to carry out all mangrove management duties, the national government increasingly recognises the opportunities that NGOs and others outside the state administration provide. The government seeks to promote and attract foreign financial and technical support from donor agencies and Western conservation organisations for the conservation and sustainable use of biodiversity, in order to meet its obligations under the convention [78]. Following the NTPF, the Prime Minister approved a 10-year forest protection and development plan for 2011–2020, including plantation and development of 100,000 ha of coastal protection forest. A number of mangrove development programmes that link to the UNCBD are listed in Table 2.

Table 2. National programs/strategies on mangrove forests related to UNCBD.

| National Programme/Strategy | Objectives |
|---|--|
| National Biodiversity Strategy to 2020, vision to 2030 | <p>Integrated biodiversity conservation into national, sectoral and provincial development strategies, plans and policies.</p> <p>Sustainable use, fair and equitable access, and sharing of benefits derived from ecosystems and biodiversity, involving community participation.</p> <p>Control activities that have a negative impact on biodiversity, such as: unsustainable use; forest conversion; pollution; and include broad participation of communities and mass media to prevent and detect illegal exploitation.</p> <p>Change in behaviour and awareness of state management organisations and communities towards biodiversity conservation and sustainable use.</p> <p>Increase of financial resources for biodiversity conservation by encourage and mobilize community participation.</p> <p>Promote integration and international cooperation in conservation and sustainable use of biodiversity.</p> <p>Actively participate in and effectively implement international treaties related to conservation and sustainable use of biodiversity.</p> <p>Promote and attract foreign resources for the conservation and sustainable use of biodiversity.</p> <p>Strengthen learning and exchange of resources and experiences with other countries and international organisations.</p> |
| National Programme to Restore and Develop Coastal Mangrove Forest for the Period 2008–2015 | <p>Protection of the existing 210,000 ha area of mangrove forest, to bring the total coastal mangrove area to 300,000 ha by 2015.</p> <p>Prioritization of afforestation and protection of 500 m wide mangrove belts in front of sea dykes.</p> <p>Development of models for mangrove rehabilitation, development and protection.</p> <p>Development of protected mangrove areas and improvement of national planning and policies and mechanisms on coastal mangrove rehabilitation and development.</p> <p>Development of a national database system for coastal mangrove management.</p> <p>Help implement national target programmes on climate change response through donor-funded projects on mangrove conservation and rehabilitation.</p> |
| The Vietnam National Strategy for Forestry Development 2006–2020 | <p>Protect forests and conserve biodiversity in an effective manner with active participation of local community people and enhance the contribution of environmental services from forests. Benefits from forest utilization and harvesting should be available for forest owners and communities participating in forest protection management, while negative environmental impacts of harvesting and use of forest should be limited. The state encourages organizations, households, individuals and local communities to invest, manage, harvest and use forests sustainably.</p> |

Table 2. Cont.

| National Programme/Strategy | Objectives |
|--|--|
| The Vietnam National Strategy for Forestry Development 2006–2020 | <p>Renovate forest sector institutions, policy, planning and monitoring: Create a favourable legal environment for forestry activities according to the market orientation and international integration, with a broad participation of households, communities and private sector. Strengthen the organizational system while planning work and monitoring in the forestry sector are renovated.</p> <p>Ensure active participation of different economic partners and social organizations in forestry development in order to maximize contributions to socio-economic development, environment protection, biodiversity conservation, provision of environmental services, hunger eradication, poverty elimination, livelihood improvement, and ensuring national security.</p> |
| National Action Plan for Protection and Development of Vietnam's Mangrove Forests 2005–2015 | <p>Promote the protection, rehabilitation and wise use of Vietnam's mangrove ecosystem towards sustainable development so that the protection function, values and its biodiversity meet the need of socio-economic development and environmental protection in river estuaries and coastal areas.</p> <p>Change the perception on mangrove ecosystem values for key managers at local (province and district) levels, mass organizations and communities in mangrove areas.</p> <p>Reinforce the effectiveness of mangrove ecosystem protection, rehabilitation and development.</p> <p>Establish and complete a legal framework for mangrove ecosystem management and encourage community-based mangrove management.</p> <p>Improve perception and understandings on biodiversity of mangrove ecosystem, and conservation values of rare and precious gene sources.</p> <p>Contribute to livelihood improvement for the people who live inside or in the vicinity of mangrove areas.</p> |

Wetland Policy

A comprehensive and effective legal framework for wetlands does not exist in Vietnam. Wetland management is addressed indirectly through various laws and regulations relating to environmental protection, agriculture, forestry and aquaculture policies [79]. The constitution of Vietnam establishes public ownership of lands, forests, rivers, lakes, waterheads and underground resources. In 1993 the Land Law was introduced which states that land is the property of the Vietnamese people, with the State as representative owner (Land Law, 2003: Article 5, Clause 1). The Land Law clearly states that land is planned and generally managed by the state, but can be allocated to individuals, households, social organizations and communities for long-term use in compliance with agreed purposes. This had a positive impact on people's land endowments, with lease holders also able to exchange, transfer or inherit land use rights, or use the land as collateral for bank loans [74]. However, whilst the Vietnam Civil Code (2005) provides for common ownership of land rights by communities, it does not recognise communities as legal entities. As such, communities cannot enter into economic transactions such as leasing and transferring their rights. Although there is formal recognition of the right of

communities to be granted land-use rights at the macro level, this is rarely the case in practice at the micro level. The Land Law affirms the need for environmental protection and the need to implement measures for land protection, enhanced sedimentation, and ecological protection. The Land Law uses the term “lands with waterbodies” to describe wetlands. However, the Land Law does not establish a separate framework for wetland management or specify the precise meaning of “lands with waterbodies”, but includes wetlands as part of other specified lands (agriculture, forest).

Wetland management issues are also referred to in sections of the Land Law relating to the protection and exploitation of aquatic resources. Wetlands here are defined as “lands with waterbodies for aquaculture and aquatic resource exploitation”. Regulations encourage economic exploitation of wetland resources and do not include a clear policy to address their conservation. The National Aquaculture Development Programme (1999) greatly influenced the rapid spread of aquaculture. This was facilitated through two central policies that: granted households the right to convert low-productivity and uncultivated land to aquaculture use; and provided financial support to poor farmers without collateral. Hence, wetlands have been exploited to increase food production without adequate recognition of their crucially important ecological functions. However, wetland issues have been covered under legislation on the protection and exploitation of aquatic resources and the prevention of damage to aquatic resources and pollution of habitats [79]. Nevertheless, government agencies are not fully aware of the special features of wetlands and instead, these agencies continue to apply a sectoral style of management, focussing on land use to exploit wetland resources. Although Vietnam signed the Ramsar Convention in 1989, international assistance on wetland resource conservation has only contributed to better understanding of the characteristics and consequences of environmental change in the five areas of Vietnam designated as Ramsar sites. A comprehensive framework for wetland management would provide a legal basis for specific regulations on wetland management and use.

Mangrove System Jurisdiction

Figure 3 illustrates the formal arrangements across levels in specific relation to mangrove system management. At the meso level, Province People’s Committees (PPC) implement and enforce the Land Law and evaluate and approve plans of organisations to convert land to other uses (agriculture, aquaculture or other productive uses). District People’s Committees (DPC) evaluate and approve household and individual plans. Plans for conversion to agriculture or aquaculture must comply with the applicable land use master plan and an environmental impact assessment must be completed. Commune People’s Committees (CPC) (the lowest level of state administration) exercise state authority over land and are temporary custodians of unallocated land. Management of trees on special use and protection forestry land is the responsibility of the Ministry of Agriculture and Rural Development (MARD) (Table 3). Although there are MARD branch offices at provincial (PARD) and district (DARD) levels, there is no department with a particular focus on mangroves. The district staff of MARD’s Department of Forest Protection usually support CPCs to manage mangrove forests. The Ministry of Natural Resources and Environment (MoNRE) is responsible for special use and protection forestry land management (including wetlands), and they also have branch offices at the provincial (PoNRE) and district (DoNRE) level responsible for local land management and supporting CPCs at each level.

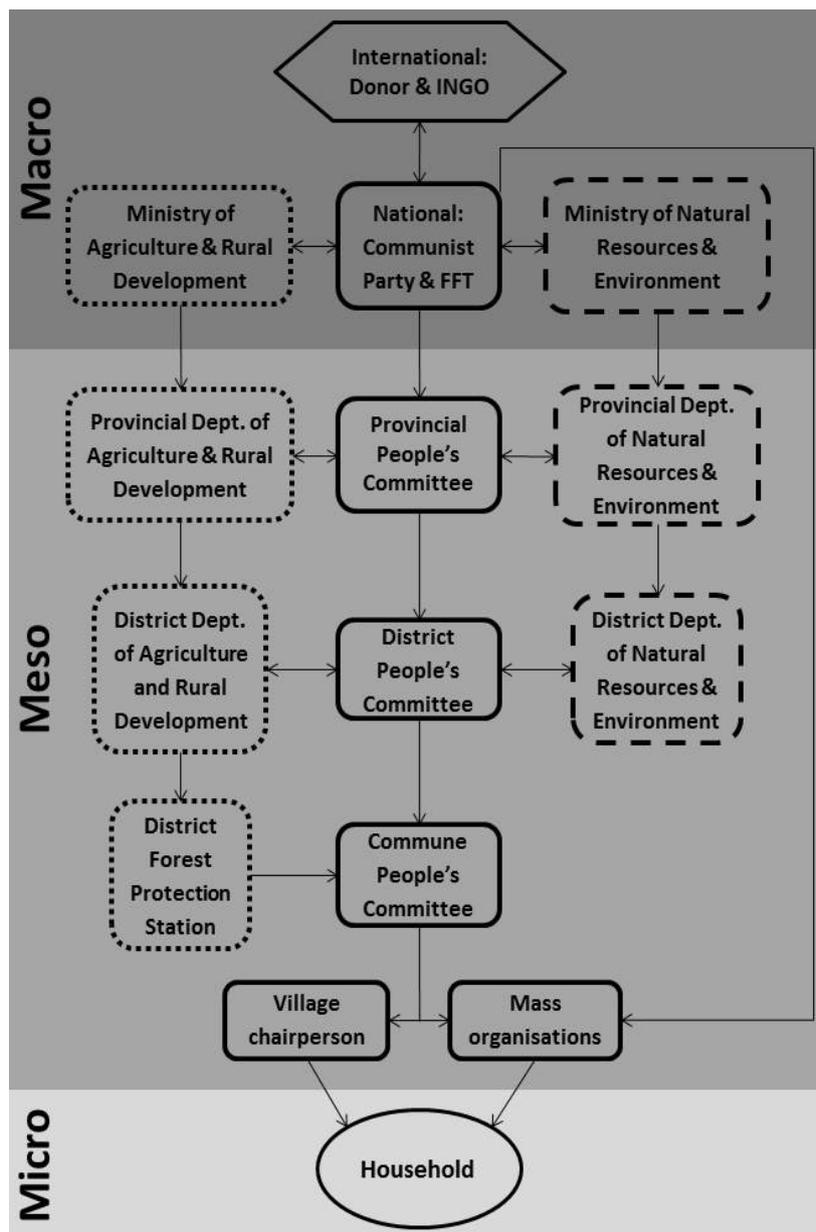


Figure 3. Formal structures for forest management in Vietnam. Adapted from: Hawkins *et al.* [80].

Table 3 Responsibilities of key ministries in mangrove governance.

| MARD (Forest/Fisheries) | MoNRE (Land/Water) |
|--------------------------------------|-----------------------------------|
| Forest use planning | Land use planning |
| Forest protection and development | Surveys and mapping |
| Forest boundary demarcation | Land allocation |
| Forest allocation and leasing | Land registration |
| Forest conversion | Issuance of land use certificates |
| Aquaculture and fisheries management | Geology and mining |
| | Water management |

The Land Law and Forest Protection and Development Law each state that MARD and MoNRE must coordinate their activities with one another in managing lands and forests [80]. Coordination is important, for example, for MoNRE to issue appropriate and accurate land use certificates. The

certificate should reflect the quality, type, and extent of any forest on the land, information that can only be obtained from MARD. If the ministries fail to coordinate, land use certificates for forest land will be incomplete and inaccurate. Yet, in practice, coordination between MARD and MoNRE at all levels is often very weak. Weak management capacity, oversight and poor coordination among relevant sectors, insufficient funding, and deficient institutional and legal frameworks have resulted in ineffective mangrove system management. The unclear and confused division of jurisdiction and weak collaboration between these two ministries creates confusion for stakeholders and uncertainty in mangrove management [81]. In addition, while People's Committees have clear jurisdiction, they may lack the resources or specialized expertise to exercise effective mangrove management [80].

The Grassroots Democracy Decree

During the 1990s, socio-political disorder exacerbated by the shortcomings of local authorities increased the awareness of the government to concerns about people's political rights, especially in rural areas, and of the risks of spontaneous resistance by those not in favour of the socio-political stabilization of the country [82]. An important development in civil cooperation, which affected household capabilities to access MSPGs, was the Grassroots Democracy Decree (1998). This gives the right to the population to be informed and carry out, discuss and monitor decisions relevant to them. The aim of the decree was to increase the participation of people in decisions about a majority of the important socio-economic activities in their localities, according to the principle of "*people know, people discuss, people do and people check*", in addition to the indirect democratic system through the National Assembly and People's Councils at all levels. MARD advised local authorities to develop village conventions for forest protection together with local residents, and provide timely information to the people on important plans and activities that will be carried out in their localities, such as state policies, new laws, the long-term and annual development plans of local authorities, budget predictions and actual expenditure by communes, as well as resolutions and plans relating to loans for the development of production, the results of inspections and checks on negative actions by state cadres, and so on [82].

In addition to the Communist Party, a special character of the political structure in Vietnam is the legal acceptance of participation in management activities by certain socio-political organizations. Many localities set up steering committees to exercise democratic rights with the participation of Communist Party members, state officials and inspection committees, as well as social organizations such as the Fatherland Front, encompassing Mass Organisations such as farmer, women, veteran, and youth unions and associations [82]. These efforts have seen varying degrees of success. At the meso level, Mass Organisations are government sponsored bodies, described in Vietnam's constitution as "the political base of people's power" mandated with promoting "national solidarity" and "unity of mind in political and spiritual matters". Hence, Mass Organisations are linked to the Communist Party at the macro level while also playing a semi-independent role at the meso level. Regarding forest governance, their key role is raising awareness of national policy and state intentions, and also mobilising local villagers and communities for protection and management of forests at the meso level. Membership of Mass Organisations is the largest of any organisation in Vietnam (membership is often mandatory with public sector employment), and State and NGO mangrove projects are largely

implemented through them. Mass Organisations are largely government funded, and are accountable primarily to the state, not their members or other citizens. Mass Organisations hold democratic elections, but elected leaders must be approved (or even pre-approved) by higher levels of government.

3.1.2. Informal Institutions

Although no informal institutions could be identified that directly relate to the use of MSPG, analysis of broader informal institutions provides the implementation context of formal institutions, providing crucial insights into the implications for their implantation into mangrove SES governance. Two logically opposed but functionally complementary principles and values are identified in Vietnamese society [83]. The first, yang, is influenced by Confucianism and comprises strict rules of behaviour based on social roles, participation in public life within a rigid hierarchy, and (male) dominance, all of which are relevant to a household's capability to influence the political decisions that govern one's life. This principle sees the world/universe as hierarchical, which should be reflected in society and people's relationships with one another. People should conform to the rules regardless of circumstance, individual preference, and consequence, or face inevitable misfortune. In line with yang, in the three study communities the rules for mangrove system use were formulated and enforced through formal governance structures. Open criticism by individuals of formal management structures was not common in any of the communities. The second principle, yin, is influenced by Buddhism and promotes notions of egalitarianism, flexibility, female participation, empathy and spontaneity. Mediation and passivity are favoured when it comes to public affairs, with participation often denigrated as a "...*futile struggle to impose one's will upon a reality that is indifferent to it*" ([83] p. 21). Nevertheless, a rich informal sector has developed in each study community which is more in line with the second principle of yin; designed to circumnavigate unsuitable top-down structures through customary codes that are more flexible, dynamic and sensitive to change. These include pooling of resources, work sharing, labour exchanges and other forms of non-financial support.

In the three study communities informal rules were principally influenced by the family unit, which largely determines sanctions, taboos, traditions, and codes of conduct. Family is the fundamental unit of social organisation. Membership and position in the family is the primary element in personal and social identity [84]. Respect for elders, obligation to parents, and benevolence, obedience, and loyalty guide the behaviours and attitudes of individuals within families. Nguyen [84] notes that individual interests are typically surrendered for the interest of the family, and relationships of mutual dependence and obligation within the family are prized. This often conflicts with a public servant's obligation to wider society, with family obligations often deemed greater than those to the public, and shame may even be directed to those that favour the latter [83]. The Vietnamese proverb "*If a man becomes a mandarin, his whole lineage can ask favours of him*" reflects the notion that those serving in the public realm will breach legalities in order to advance family interests.

Vietnamese families are patriarchal [84]. As well as performing most of the domestic duties, women also worked long hours on aquaculture farms as waged labourers, collecting MSPG, tending to the household farm or working as labourers on construction sites. Although the crucial role of women within the household was recognised and highly regarded among most households in the study communities, they were often observed and described to be subordinate to men. Observations were

consistent with Jamieson [83] who suggests that women are frequently expected to be submissive, supportive and compliant towards their fathers when young; their husbands when married; and their sons when old. Despite formal recognition of the right of women to acquire land-use rights at the macro level, due to informal patriarchal customary norms, it is rarely the case in practice at the micro level. These entrenched customary norms constrain women's access to land [85]. Although Vietnam's Land Law states gender equality regarding access to property and land rights, in practice, women are allocated less land and often not included on land-use right certificates. These certificates are required for formal state recognition of use rights, secure tenure, formal land transactions, access to formal credit and for the legal protection of land-use rights [86]. Subsequently, the land endowments of women are greatly reduced.

The nuclear family is embedded within the extended family, which includes the deceased and not yet born. Rambo [87] states that there are strong obligations to repay ancestors for the gift of life which is deemed a determining component of virtue and achievement, as ancestors accumulate (spiritual) merit through their efforts and sacrifices to ensure family heritage. Most households engaged in veneration and offerings to deceased family members. Jamieson [83] writes that any success experienced by individuals increases their obligation to give thanks, and in all households small shrines were apparent, with photos, incense and food offerings to ancestors. In all three communities, temples were present in the grounds of many wealthy households, which were often larger and more elaborate than living quarters, to signify success, wealth, and virtue in veneration to their ancestors.

The literature suggests three overarching worldviews of nature in Vietnam [88], which were confirmed during dialogue with interviewees. The first implies that people should maintain balance and live in harmony with nature [89]. Interviews with households indicated that the spirits of ancestors are often believed to reside in nature, and should be honoured in rituals and offerings in order to maintain harmony between the elements, ancestors and people. Beliefs are highly superstitious and failure to comply is believed to invoke bad luck. The second sees nature as a resource to be exploited for the benefit of society [90]. Interviews with government officials suggested that they regard the environment as a resource to foster the economic growth of Vietnam, and that the environment will heal itself once a satisfactory standard of living has been achieved. Finally, nature is viewed as a threat to human survival, in the form of floods, typhoons, droughts and other natural hazards [91]. Interviews in all three communities indicated that deep sea fishing was not practiced as it was perceived as "...dangerous..." and "...people have died..." (Male interviewee, Giao Xuan, June 2012). This places greater pressure on intertidal areas to provide food for subsistence and income.

3.2. The Role of State, Private Sector and Civil Society Actors at the Macro and Meso Level in Mangrove SES Governance

State, private sector and civil society actors are central to mangrove SES governance, providing the links between institutional levels that shape household endowments, entitlements and capabilities. This section focuses on objective two, using the environmental entitlements framework to identify how these actors have modified and shaped mangrove SES governance structures at macro and meso levels.

3.2.1. Macro Level Institutional Actors

Since economic reform (in 1986), the central State's main concern is achieving economic growth. Corresponding with the worldview that depicts the environment as a resource, economic growth is fuelled by extraction-based export industries, with (often illegal) river and ocean bed sand mining posing a particular threat to mangrove systems. Vietnam's MSPG were opened to domestic and international markets, most notably China. This rapidly increased the price of MSPG, and combined with the devolution of land management, resulted in rapid growth of the aquaculture industry.

In light of the 2004 tsunami and increasing intensity of typhoons in the region, and worldviews that consider the environment as a threat to human survival, there has been growing recognition of the benefits mangrove forests provide:

“More mangroves mean that provincial governments need less money from us for storm damage and dike maintenance.” (Male interviewee, National government, August 2012)

Recognising their lack of capacity to undertake large scale mangrove rehabilitation, the government has increasingly accepted external support, acknowledging the benefit international NGOs offer through their global experience working in coastal areas. Vietnam has recently been the target of numerous mangrove afforestation projects. This has been facilitated by increasingly open international relations following economic reforms at the macro level, allowing international development agencies, both governmental and non-governmental, to provide the necessary finance and capacity to Vietnam's government to undertake substantial replanting initiatives. International NGOs must clearly demonstrate how their work will align with government policies in order to be granted permission to work in Vietnam. Although this has created opportunities for new relationships to be forged between various stakeholders, relationships are still in line with the informal institution of not speaking out in public on formal issues. However, these novel arrangements present some complications:

“Ministries work under the state so they are not often critical. INGOs can be more outspoken than Vietnamese, it's the culture. But Vietnamese NGOs have the cultural understanding to be able to challenge the state without them being too offended because they are not outsiders pointing the finger, it can be received more favourably. It's complicated...you need to find a balance.” (Female interviewee, international donor, September 2012)

The signing of numerous international economic and environmental agreements (such as accession to the World Trade Organisation, and the UNCBD and Ramsar convention) in order to foster financial support from international donors has also led to a plethora of conflicting rules and regulations. Furthermore, national policy and regulations have failed to keep pace with the rapidly growing aquaculture industry. Insufficient coordination and increased competition for limited funds between and within administrative levels of MARD and MoNRE have compounded an already weak regulatory framework, with concern that mangrove areas are subject to the same regulatory framework and categorisation as terrestrial forests:

“Mangroves are highly sensitive and need unique conditions in order to grow. They have different uses for different groups and face different challenges than terrestrial forests.”
(Male interviewee, international donor, August 2012)

Despite the significant rise of mangrove conservation in terms of policy attention, substantive change has been negligible. This is reflective of the yang principle of Vietnamese society:

“There is still too much emphasis on top-down management in Vietnam. Although there is lots of talk of bottom-up management, most officials are unfamiliar with these concepts so there is little change on the ground.” (Male interviewee, University institute, August 2012)

3.2.2. Meso Level Actors

Achieving short-term national economic targets remains the priority of local authorities. Devolution of land use and decentralisation of land allocation within weak policy and regulatory frameworks, combined with market liberalisation, has meant that many provinces are able to generate income surpluses, largely through MSPG exploitation, concurrent with the “natural environment as resource” world view. Consequently, some local authorities may contribute significantly to the national budget and no longer require provincial or central State support. This is particularly so in areas with successful aquaculture farming sectors and can reinforce the local authority’s ability to overrule decisions made at higher levels.

In the early 1990s aquaculture was established on the intertidal mudflat areas in Giao Xuan. This was largely due to strong trade links with China that facilitated access to the necessary networks and skills to exploit the lucrative clam market. In Da Loc the clam aquaculture industry took longer to establish, developing during the late 2000s as locals observed the financial benefits gained by neighbouring provinces. Local households in both Giao Xuan and Da Loc were encouraged to take loans to develop aquaculture farms. In Dong Rui, the Sino-Vietnamese War (1979) saw the extensive mangrove area previously settled by ethnic Chinese groups resettled by ethnic “kinh” Vietnamese from nearby Hai Phong city. Huge swathes of mangrove land were allocated to shrimp aquaculture investors from Hai Phong city and surrounding coastal provinces, who had connections to the newly appointed local authorities.

When local authorities observed the financial potential of aquaculture, large areas were allocated for aquaculture development:

“The district came when they saw they could make money from auctioning land and imposing taxes. You can have as much land as you want, as long as you have the money or you are well connected.” (Male interviewee, Giao Xuan, June 2012)

Hence, having connections to local authorities and the necessary finance enabled better off households to acquire sections of wetland for aquaculture development, and marginalised households lacking these resources. Furthermore, restrictions on the amount of land any individual could acquire led local officials to use the names of family and friends or pseudonyms to sign contracts for large scale investors.

At the same time local authorities recognised the benefits that mangroves provide, and encouraged NGO-led mangrove projects in their jurisdiction. However, with land scarce for mangrove projects, households complained that land would often be annexed for projects with little compensation given:

“The government took my land and sold it to the foreigners to plant trees. They don’t care about the trees as long as they get the money for the projects.” (Male interviewee, Giao Xuan, June 2012)

In addition, concerns were also expressed that when projects finish the land will be reallocated and converted back to aquaculture.

Interviews with national university representatives suggested that in many cases local authorities lack understanding of new concepts introduced by international NGOs relating to mangrove management, such as co-management or community-based management. As such, local authorities often only agree to short-term commitments, needing to see the benefits of projects (usually economic) before longer-term commitment is considered. Interviews with international donors suggest that this has led to a multitude of pilot projects:

“...the government have piloted numerous community-based projects, which keeps the international donors happy, while nothing substantive actually happens on the ground, keeping local authorities happy. We need to see real change and long-term commitments that recognise the rights of communities to manage forests.” (Male interviewee, international donor, September 2012)

Interviews with Vietnamese NGOs and International NGOs revealed that their definition of “community-based projects” entails working with the local authorities, Unions and village heads through formal institutional structures. However, households frequently perceived these institutions as illegitimate, suggesting that they are formed through cliques of family and friends of local elites. Hence, NGO projects were often channelled through networks that marginalise certain households lacking connections to local elites. Nevertheless, it was recognised that NGOs must manage their relationships with local authorities carefully, otherwise they risk compromising their ability to work in the locality.

3.3. Micro Level MSPG Entitlements

This section addresses objective three and situates household MSPG entitlements within the prevailing governance structures and processes occurring at the macro and meso levels.

In Giao Xuan and Da Loc, land reform permitted some households to acquire mangrove system land, while economic reform facilitated some households’ access to domestic and international markets, networks, and knowledge. Many exploited these opportunities, combining social, human, and financial endowments to develop successful aquaculture farms and increase their entitlements to MSPG, while households lacking these resources became increasingly marginalised. Although most ventures were highly productive in the initial 2–3 years, productivity fell significantly due to lack of environmental planning. While some aquaculture farmers were able to draw on financial and human

capital to sustain their aquaculture farms, many struggled and often resorted to selling farm assets causing endowment loss and increased marginalisation:

“I got a bank loan to set up an aquaculture farm, but I didn’t know anything about aquaculture. When all the animals died I couldn’t make money. I got more bank loans to pay my debts hoping that the animals would return...but they never did. I had to sell everything at a cheap price and now life is a struggle.” (Male interviewee, Da Loc, August 2012)

In Dong Rui, only a very small number of households closely connected to the local authorities benefitted from political or economic reform as the majority of mangrove system land was allocated to external aquaculture investors. Most households expressed the feeling of increased marginalisation and the negative environmental impacts of a rapidly growing aquaculture industry:

“They came and used big machinery and strong chemicals to prepare the land for aquaculture...the water turned dirty and polluted.” (Male interviewee, Dong Rui, July 2012)

In all three communities, mangrove commons drastically reduced compared to the pre-reform era due to the growing aquaculture industry, with more MSPG dependent households facing increased marginalisation and dangers through this endowment loss:

“Now we have to go by boat to find the animals and it is very dangerous. Two years ago four women were on a boat and a strong wind sank the boat and they all died. One man will always go to steer the boat now, meaning we spend less time doing work at home.” (Male interviewee, Dong Rui, July 2012)

Increased prices for intertidal seafood have also incentivised MSPG collection for sale, increasing pressure on the reduced common areas, with MSPG often being harvested before they are old enough to reproduce. The combined effect of environmental impacts caused by aquaculture, and increased pressure on greatly reduced common areas for MSPG, has contributed to the reduced quantity and quality of MSPGs. This is having a negative impact on those households most dependent on MSPG for their livelihoods, increasing their marginalisation through reduced productivity of mangrove systems that provide MSPG.

Household interviews revealed that land given by local authorities for mangrove planting projects had also reduced the amount of common land for MSPG, causing further marginalisation and endowment loss to households highly dependent on MSPG. Local residents are usually prohibited from entering newly planted areas during the initial sensitive years of tree development and then find it difficult to collect MSPG in more densely forested mature mangroves. Households stated that projects were typically imposed in a top-down manner with little community input. Concerns were expressed that large international NGO projects allowed various levels of state administration to further capture the benefits of projects. When funds have filtered down through all the levels of government, there is little money left to pay households participating in mangrove projects at the micro level, resulting in negative entitlement changes through transfer failures:

“We know that the foreigners give the government lots of money to plant trees, but the Commune, village and Union leaders take most of the money themselves and don’t leave much for us. We get some money, but not as much as I could make collecting crabs.”
(Female interviewee, Dong Rui, July 2012)

In addition, projects relating to coastal livelihoods in Giao Xuan, which aim to reduce pressure on mangrove systems through alternative livelihoods (e.g., bee-keeping, mushroom growing, eco-tourism), are little known among more marginalised households. Those households with awareness stated that these projects fail to target the poorest or most dependent on MSPG, and are often appropriated by family and friends of local authorities. This results in negative MSPG entitlement changes for the most mangrove dependent households through transfer failures.

Households frequently attributed wetland degradation to the conduct of local authorities, making them reluctant to be involved in mangrove projects:

“...I have never been asked for my opinion; we just get told to plant...we are given small money to plant trees that the government cut down and destroyed in the first place!”
(Female interviewee, Dong Rui, July 2012)

Households suggested that opinions and concerns expressed through formal channels are largely ignored, and those speaking out could even face retribution from local authorities and further marginalisation for doing so:

“There is nobody we can turn to in order to raise concerns. Nothing ever changes and your life will be made much more difficult for speaking out. The Unions, the village committee, and the commune are all family or friends with each other” (Female interviewee, Da Loc, August 2012)

A project by one particular INGO did request feedback from residents, and the information gained was crucial to the success of the project:

“...we told (the INGO) about the barnacles on the young trees. They take nutrients from the trees and are too heavy for the branches and make them snap, so (the INGO) pays us to scrape the barnacles off the young trees now.” (Male interviewee, Da Loc, August 2012)

Nevertheless,

“(the INGO) does try to understand the local people, but it is difficult for them because people are afraid to speak out...Any problems with the mangroves are due to the local government, not (the INGO). I am worried that when (the INGO) leave the mangroves will disappear again.” (Male interviewee, Da Loc, August 2012)

Instances of collective action occurred in all three communities to challenge local authorities on matters related to mangrove land allocation and financial matters. These actions and decisions were made between households based on the yin principle. These were met with varying degrees of success,

with one outcome being that the community in Dong Rui forced the local chairman to resign. As local officials were unresponsive to residents' demands, the community circumvented the formal meso level of state authority, taking their concerns, at great expense and jeopardy, straight to the national government in Hanoi.

However, households stated that the chairman was replaced with a representative who exhibited similar behaviour to his predecessor, by which time the community were too tired to protest again. With little avenue for recourse, such as alternative political parties, an open media, or thriving civil society, households expressed how they have become disillusioned and detached from political issues. This lack of public participation has been facilitated by top-down and non-participatory governance structures. Subsequently, substantial constraints are placed on household capabilities to influence decision making processes, and thereby modify or improve their entitlements in the light of challenges emanating from political and economic reform.

4. Discussion

This section considers the implications of actions taken at macro and meso levels of governance (objectives 1 and 2) for household (micro level) entitlements to MSPG (objective 3). The institutional challenges are discussed in relation to the effects of transition on: endowments (*i.e.*, social, human, financial, physical and natural capital) and the ability to bundle these into entitlements; and the capability to participate in mangrove system governance and shape MSPG entitlements.

4.1. Endowments and Entitlements

Endowments of social capital allow certain households to access and mobilise other types of endowment (*i.e.*, human, financial, physical and natural) in order to increase their environmental entitlements. Results show that political and economic reforms implemented within weak formal institutional settings create the opportunity for elite capture, as local authorities reinterpret national regulations and policies to their advantage and distribute the benefits among their networks. This is in line with findings from Vietnam's central highlands, where broader political and economic processes in tandem with local power relations resulted in elite capture, limiting the access of marginalised groups to the resources and benefits emanating from devolution [48]. Such occurrences reflect the downside of social capital noted by Adhikari [92], whereby hierarchical social structures make upward enforcement of rules impractical, resulting in networks of powerful groups acting with impunity. Further, results illustrate how economic reforms have granted some households access to market oriented social networks external to the community in order to take advantage of lucrative aquaculture opportunities. This is consistent with findings from Ahmed *et al.*'s [93] study of tea agroforests in the Akha highlands of Southwest China. In their study, powerful local actors were able to forge new social networks external to the community in order to take advantage of price premiums through niche market networks, options that were not available to actors who had been disempowered by the introduction of market forces. These findings suggest that as reforms reorient governance structures and processes towards market forces, elite capture and the increasing influence of market networks external to the community risk undermining the creation of social institutions that foster the power sharing and trust necessary to support sustainability [94].

Endowments of human capital can be fostered by engagement with market orientated social networks external to the community. Results indicate that those with access to such networks were able to access the necessary skills and knowledge (e.g., economic, technical) to establish successful aquaculture farms, and typically formed new community networks with other successful households in order to share information to advance their success. This is consistent with substantial evidence in the literature suggesting that social capital can be used as a mechanism to build and use aspects of human capital [95–97]. Results are also consistent with those of King [98], who notes that actors which are successful in furthering their goals will actively seek ties with similar others and share information in order to continue the pursuit of their goals. Marginalised households lacking access to human capital share information on local environmental conditions necessary for MSPG. This is consistent with research suggesting that deficits in human capital can be compensated by building social capital in order to share information more frequently and with greater number of others in order to support livelihoods [95]. Taken together our results add further support to the well-established relationship between human and social capital [99], while contributing to our knowledge of how this relationship shapes environmental entitlements through the ability to gain human capital through social capital.

Endowments of financial capital shape the distribution of resources within communities which affects environmental entitlements. Results indicate that the increasing influence of market forces meant that households with access to financial capital were able to mobilise their social and human capital to develop aquaculture farms, further increasing their financial capital. Other research shows that even when endowments are relatively equal, entitlements to ecosystem services are highly differentiated within communities depending on household human and financial capital [48]. Adger *et al.* [100] found that subsequent inequalities in wealth result in the concentration of resources among a small number of households, whilst marginalised households lose access to significant livelihood resources and opportunities and become increasingly dependent on natural resources. Hence, ecosystem provisioning goods provide an important mechanism for reducing income inequality [101] as their collection is free and requires little capital outlay [102]. However, when economic growth is given priority over social and environmental goals, market forces can place natural resources under increased pressure [103], as was observed with the rapid development of aquaculture. Market incentives prompted local governments to explicitly encourage aquaculture and the clearing of mangrove forests, placing greater pressure on wetland ecosystem services [67]. Therefore, even with increased wealth from a rapidly growing aquaculture sector, foraging activities still persist among poor households, and market incentives encourage households to increase pressure on reduced mangrove system commons. This further degrades the significantly reduced mangrove system commons, reducing the environmental entitlements of more marginalised households.

Financial capital enables some households to increase their endowments of physical capital, often at the expense of more marginalised households. Results show how households that have been successful in aquaculture utilise market forces to consolidate their position via the acquisition of cheap physical assets from unsuccessful households, who often face mounting debts from loans required for the capital outlay to start up aquaculture. Physical capital assets, such as wells and livestock, not only directly provide these households with access to water and food but also create flows that increase stocks of other types of capital (e.g., financial capital) [104]. Several studies highlight the complexity of a household's decision to sell physical assets in response to shock, which considers not only the

short-term economic value, but also risk perception and the opportunity cost of the sale in the short and long term [105]. Contextual factors such as household wealth, shaped by access to skills, knowledge, networks and markets, influenced the decisions and market strategies that were available to households, corresponding with Sabates-Wheeler and Devereux [106]. Whilst better-off households had the assets to use markets as a profitable livelihood strategy, market engagement among poorer households typically reflects subsistence needs and a last resort response to distress [107]. Results here are concur with the sequential stages of market engagement outlined by Sherman and Ford [108], whereby: market transactions initially attempt to expand and secure future livelihood capacity; distress forces households to sell physical assets under unfavourable market conditions and at low prices in order to survive. Such actions can seriously impair environmental entitlements of marginalised households through reduced endowments of physical capital, negatively impacting future livelihood and household well-being [43].

Endowments of natural capital have been reduced for marginalised households as a result of the formalisation of private tenure rights. Results show that households with high dependency on MSPG face reduced access to mangrove system commons due to conversion to private aquaculture farms. The government has essentially decentralized responsibility for forests, not from the State to households, but to various lower level State entities [109]. Furthermore, restrictions to natural capital through private tenure systems reduce the access of dependent households to the ecosystem services necessary to support their livelihoods [110]. Research indicates the link between poverty and low levels of natural capital [111] which can offer a way out of poverty for marginalised households, but only when used effectively in conjunction with social, human, financial and physical assets [112]. The devolution of forest-use rights has not been comprehensive and far-reaching enough, which can result in the same institutional problems associated with centralised state ownership and additional misallocation of land to privileged actors [73]. In some places local conflicts occurred among coastal villagers over the allocation of land for aquaculture [67]. This caused livelihood insecurity, which can reduce household motivations for sustainable mangrove system management [73]. This has contributed to inequities between rich and poor and enhanced the difficulty in achieving cooperation among communities [73]. The continued reliance of these households on natural capital emanating from a significantly reduced commons reflects ongoing hardship, and may contribute to over exploitation and degradation of the natural resource base [113]. This was particularly true for female headed households, with results that are consistent with Mwangi and Dohrn [114] whereby informal patriarchal customary norms undermine formal recognition for women to acquire land. Furthermore, subsequent to formalisation of private tenure rights the remaining mangrove commons have become de facto open access and it is almost impossible for women and communities to defend their endowments against outsiders and local governments, who often appropriate land in the name of national interest and development [67].

4.2. Capabilities

The lack of meaningful participation of MSPG users in formal institutions reduces their capability to negotiate and influence the processes and structures that shape MSPG entitlements. Such findings contradict the national obligations to the UNCBD (*i.e.*, governance, participation, and equity and benefit sharing). Results indicate a lack of polycentric and multi-level characteristics, with the current

institutional arrangements limiting household capabilities and implications for the appropriateness and effectiveness of mangrove system governance. Governance emphasises shared responsibility and partnerships of diverse actors from different levels, and requires effective participation from all stakeholders [115]. It was observed that transition processes had essentially decentralized responsibility for forests, not from the State to households, but to various lower level State entities [109]. Subsequently, public involvement in mangrove system governance was typically conducted through authorised state channels, such as commune authorities and Mass Organisations. Such arrangements have been shown to result in technocratic, expert-driven and non-transparent governance processes [116]. The lack of effective participation of all stakeholders, particularly the most marginalised, limits the development and capability of all actors to contribute to the eventual emergence of collaborative governance [94]. Subsequently, Vietnam's transition has lacked the norms of accountability and local participation in management decisions. The literature suggests that for decentralisation to work, democratically operational local governments and institutional constraints are necessary in order for authority figures to be accountable for their decisions [117,118]. Without this, communities lack the capability to exert pressure on local authorities deemed to be violating management rules or misappropriating resources [119].

The enduring top-down institutional structures and processes of the state limit the opportunity for collaborative governance and the capabilities of MRDC. A legacy of central planning, involving stringent targets for government bodies often lacking the capacity to exercise effective management, was found to result in government agencies often unwilling to work with local users, particularly if there is no prior practice of shared decision making. This has implications in terms of the distribution of revenues derived from mangrove systems as communities are not legal entities under Vietnamese law and so cannot enter into legally binding contracts [120]. Such observations are inconsistent with collaborative governance, which emphasises partnerships between state and non-state actors to foster capacity and institution building at all levels of governance [94]. Effective participation can enhance the capability of all stakeholders to shape collaborative governance towards a common goal [26]. However, results show low levels of citizen participation in mangrove system governance. Research indicates that in developing countries in transition, with low levels of participation, civil society plays a potentially crucial role in facilitating and institutionalising participation in environmental governance [121]. However, scant formal or informal recognition of communities in natural resource management, and the limited advocacy role of NGOs, mean that efforts to rehabilitate and restore mangrove system areas risk reinforcing the enduring legacy of top-down planning, as has been found elsewhere [122]. The lack of specific relevant policies and operational mechanisms for equitable sharing of benefits from biodiversity resources is hindering promotion of large-scale community participation in sustainable mangrove system governance. Therefore, it is crucial that emerging civil society institutions are inclusive and responsive to micro level actors, while linking the interests of these actors to higher levels of decision-making.

Current mangrove system governance also risks reinforcing pre-existing power structures. Due to the one-party political context operating in Vietnam, along with low recognition of civil society and negligible levels of press freedom, concerned citizens have limited alternative avenues to appeal against the decisions of the state. Results indicate that transition processes have resulted in a concentration of power and wealth at the meso level, limiting the capability of MRDC to shape

mangrove system governance. The subsequent lack of accountable and transparent dialogues and mechanisms for active participation in the development of institutions limits collaborative governance, requiring some degree of power and responsibility sharing in decision making between the State and resource users [94]. The observed lack of participation can undermine levels of trust within localities, which is an essential part of collaborative governance [94] that facilitates the capability of MRDC to influence and shape common goals [123]. Recognising the constraints posed by local power structures that limit the capability of MRDC to participate in mangrove system governance, accountable and transparent institutions should be developed to increase the capabilities of all stakeholders and actors to be actively involved in the development, evaluation and monitoring of governance processes. Bridging actors or organizations are necessary to be available as active facilitators of these processes and mechanisms. Hence, it is crucial that emerging civil society institutions, particularly those developing between the State and NGOs, are inclusive and responsive to micro level actors, while linking the interests of these actors to higher levels of decision-making. Such institutional processes and structures are necessary for the sustainable governance of mangrove systems.

5. Conclusions

By analysing multiple levels of mangrove SES governance, findings demonstrate the importance of considering how these interacting elements have shaped environments entitlements. By using a framework that provides insights into the ability of households to gain legitimate access to MSPG, this study shows how State, private sector and NGO actors operating at the macro and meso levels have shaped mangrove system entitlements at the micro level (*i.e.*, households). Whilst calls for multi-level governance of SES are welcomed, it must be acknowledged that such an approach is not conducive to the Vietnamese situation.

Employing the adapted environmental entitlements framework has provided insights into how transition processes have altered mangrove SES governance and shaped local access to mangrove system resources. The devolution of land management from central government to households, decentralisation in land allocation authority from central to local government, and market liberalisation, have been implemented within a weak formal institutional framework, creating the opportunity for local authorities to re-interpret reforms and regulations to their advantage. Furthermore, the lack of clear regulation on mangrove system land results in a bias towards the informal institutional context that favours patriarchy, hierarchy and detachment relating to public affairs, resulting in concentration of power and wealth at the meso level (*i.e.*, local). Subsequently, mangrove system land has been appropriated by households with access to finance, labour, skills, networks and markets in order to develop successful aquaculture farms. Findings demonstrate how the entitlements of marginalised households have been negatively impacted through: (1) reduced mangrove system endowments due to the reduction and degradation of mangrove system commons; (2) entitlement failure through social, political and economic processes that have institutionalised limitations on the opportunities and rights of marginalised households to access mangrove systems; and (3) reduced capabilities of MRDC to influence and shape the institutions of mangrove system governance. Therefore, it is crucial to acknowledge the impact of rapidly growing aquaculture on environmental entitlements if policies to sustainably manage mangrove systems are to be successful. In particular, the

institutional structures and processes within and between various levels of mangrove SES governance that shape opportunities and rights to mangrove systems for the most marginalised. Results demonstrate that the Vietnamese experience may not be conducive to multi-level governance of mangrove SES, and further research is required to identify the specific institutions to achieve this. However, policies that provide all stakeholders with the capability to influence the political aspects of mangrove SES governance, support institutions which foster accountability in governance processes and offer alternative avenues of recourse, encourage civil society and the opportunity and ability to participate in decision making processes, are all useful starting points for improving environmental entitlements.

Findings presented here shed light on theoretical concepts that go beyond the specific cases, highlighting important features of institutional structures and processes that should be considered within environmental governance more widely. For example, transition policies implemented within weak institutional settings can result in the concentration of power and wealth among elites at the meso level, creating a significant barrier to multi-level governance with negative impacts on the environmental entitlements of more marginalised actors. This has implications for mangrove system governance and the institutional processes that shape the equitable distribution of natural resources. How mangrove SES change affects household entitlements to mangrove system goods depends on institutional structures and process that occur between and among multiple levels of mangrove SES governance, and will manifest differently depending on the level of accountability, transparency and participation in decision making processes.

Acknowledgments

This work was funded through the Centre for Climate Change Economics and Policy (CCCEP), an Economic and Social Research Council Centre, and a Philip Leverhulme Prize in Geography. We are grateful to all stakeholders for their time and expertise: the communities of Giao Xuan, Da Loc and Dong Rui, Marinelife Conservation and Community Development (MCD), the Centre for Natural Resource and Environment Studies (CRES), and CARE Vietnam.

Author Contributions

Steven Orchard led the writing of this paper and undertook the planning, research design and methodology, data collection and analysis. Lindsay C. Stringer and Claire H. Quinn provided significant academic input regarding the planning stages of the research project, the research design and methodology, and provided input to the analysis, structuring and writing of the final article.

Conflicts of Interest

The authors declare no conflict of interest.

References

1. Giri, C.; Ochieng, E.; Tieszen, L.L.; Zhu, Z.; Singh, A.; Loveland, T.; Masek, J.; Duke, N. Status and distribution of mangrove forests of the world using earth observation satellite data. *Glob. Ecol. Biogeogr.* **2011**, *20*, 154–159.

2. Pendleton, L.; Donato, D.C.; Murray, B.C.; Crooks, S.; Jenkins, W.A. Estimating global “blue carbon” emissions from conversion and degradation of vegetated coastal ecosystems. *PLoS ONE* **2012**, *7*, doi: 10.1371/journal.pone.0043542.
3. McIvor, A.L.; Möller, I.; Spencer, T.; Spalding, M. *Reduction of Wind and Swell Waves by Mangroves*; Natural Coastal Protection Series: Report 1. Available online: <http://repository.tudelft.nl/view/hydro/uuid:c77ceec8-8db6-4080-b5bb-f414dca9d39d/> (accessed on 27 November 2015)
4. Spalding, M.; Kainuma, M.; Collins, L. *World Atlas of Mangroves*; A Collaborative Project of ITTO, ISME, FAO, UNEP-WCMC, UNESCO-MAB, UNU-INWEH and TNC; Earthscan: London, UK, 2010; p. 319.
5. Brown, C.; Corcoran, E.; Herkenrath, P.; Thonell, J. *Marine and Coastal Ecosystems and Human Wellbeing: A Synthesis Report Based on the Findings of the Millennium Ecosystem Assessment*; United Nations Environment Programme (UNEP): Nairobi, Kenya, 2006.
6. Joffre, O.M.; Schmitt, K. Community livelihood and patterns of natural resources uses in the shrimp-farm impacted mekong delta. *Aquac. Res.* **2010**, *41*, 1855–1866.
7. Orchard, S.E.; Stringer, L.C.; Quinn, C.H. Mangrove system dynamics in southeast asia: Linking livelihoods and ecosystem services in Vietnam. *Reg. Environ. Chang.* **2015**, doi:10.1007/s10113-015-0802-5
8. Berkes, F.; Folke, C. *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*; Cambridge University Press: New York, NY, USA, 1998.
9. Cash, D.W.; Adger, W.N.; Berkes, F.; Garden, P.; Lebel, L.; Olsson, P.; Pritchard, L.; Young, O. Scale and cross-scale dynamics: Governance and information in a multilevel world. *Ecol. Soc.* **2006**, *11*, 8.
10. Bevir, M. *Governance: A Very Short Introduction*; Oxford University Press: Oxford, UK, 2013.
11. Hufty, M. *Governance: Exploring Four Approaches and Their Relevance to Research*; Geographica Bernensia: Bern, Switzerland, 2011.
12. North, D. *Institutions, Institutional Change and Economic Performance*; Cambridge University Press: Cambridge, UK, 1990.
13. Folke, C.; Hahn, T.; Olsson, P.; Norberg, J. Adaptive governance of social-ecological systems. *Annu. Rev. Environ. Resour.* **2005**, *30*, 441–473.
14. Paavola, J. Institutions and environmental governance: A reconceptualization. *Ecol. Econ.* **2007**, *63*, 93–103.
15. Mwangi, E.; Wardell, A. Multi-level governance of forest resources. *Int. J. Commons* **2012**, *6*, 79–103.
16. Powell, N.; Osbeck, M.; Sinh, B.T.; Toan, V.C. *Mangrove Restoration and Rehabilitation for Climate Change Adaptation in Vietnam*; World Resources Report. Available online: http://www.wri.org/sites/default/files/wrr_case_study_mangrove_restoration_vietnam.pdf (accessed on 27 November 2015).
17. Blomquist, W. Multi-level governance and natural resource management: The challenges of complexity, diversity, and uncertainty. In *Institutions and Sustainability*; Beckmann, V., Padmanabhan, M., Eds.; Springer: Dordrecht, The Netherlands, 2009; pp. 109–126.

18. Agrawal, A. *The Role of Local Institutions in Adaptation to Climate Change*; Social Development Department, TheWorld Bank: Washington, DC, USA, 2008.
19. Luttrell, C. Adapting to aquaculture in Vietnam: Securing livelihoods in a context of change in two coastal communities. In *Environment and Livelihoods in Tropical Coastal Zones: Managing Agriculture-Fishery-Aquaculture Conflicts*; Hoanh, C.T., Tuong, T.P., Gowing, J.W., Hardy, B., Eds.; CAB International: Norfolk, UK, 2006; Volume 2, pp. 17–29.
20. Nagendra, H.; Ostrom, E. Polycentric governance of multifunctional forested landscapes. *Int. J. Commons* **2012**, *6*, 104–133.
21. Nkhata, B.A.; Mosimane, A.; Downsborough, L.; Breen, C.; Roux, D.J. A typology of benefit sharing arrangements for the governance of social-ecological systems in developing countries. *Ecol. Soc.* **2012**, *17*, 17.
22. Carpenter, S.R.; Mooney, H.A.; Agard, J.; Capistrano, D.; DeFries, R.S.; Diaz, S.; Dietz, T.; Duraipah, A.K.; Oteng-Yeboah, A.; Pereira, H.M.; *et al.* Science for managing ecosystem services: Beyond the millennium ecosystem assessment. *Proc. Natl. Acad. Sci. USA* **2009**, *106*, 1305–1312.
23. Adger, W.N. Institutional adaptation to environmental risk under the transition in Vietnam. *Ann. Assoc. Am. Geogr.* **2000**, *90*, 738–758.
24. Tri, N.H.; Adger, N.W.; Kelly, N.P. Natural resource management in mitigating climate impacts: The example of mangrove restoration in Vietnam. *Glob. Environ. Chang.* **1998**, *8*, 49–61.
25. Hamilton, S. Assessing the role of commercial aquaculture in displacing mangrove forest. *Bull. Mar. Sci.* **2013**, *89*, 585–601.
26. Ostrom, E. *Governing the Commons: The Evolution of Institutions for Collective Action*; Cambridge University Press: Cambridge, UK, 1990.
27. Helmke, G.; Levitsky, S. Informal institutions and comparative politics: A research agenda. *Perspect. Politics* **2004**, *2*, 725–740.
28. Goldman, M.J.; Riosmena, F. Adaptive capacity in tanzanian maasailand: Changing strategies to cope with drought in fragmented landscapes. *Glob. Environ. Chang.-Hum. Policy Dimens.* **2013**, *23*, 588–597.
29. Klijn, E.; Koppenjan, J.F.M. Institutional design: Changing institutional features of networks. *Public Manag. Rev.* **2006**, *8*, 141–160.
30. Garud, R.; Hardy, C.; Maguire, S. Institutional entrepreneurship as embedded agency: An introduction to the special issue. *Organ. Stud.* **2007**, *28*, 957–969.
31. Markvart, T.I. Understanding Institutional Change and Resistance to Change towards Sustainability: An Interdisciplinary Theoretical Framework and Illustrative Application to Provincial-Municipal Aggregates Policy. Master's Thesis, University of Waterloo, 2009.
32. Cheng, A.S.; Gerlak, A.K.; Dale, L.; Mattor, K. Examining the adaptability of collaborative governance associated with publicly managed ecosystems over time: Insights from the front range roundtable, colorado, USA. *Ecol. Soc.* **2015**, *20*, doi:10.5751/ES-07187-200135.
33. Andersson, K.P.; Ostrom, E. Analyzing decentralized resource regimes from a polycentric perspective. *Policy Sci.* **2008**, *41*, 71–93.
34. Beitzl, C.M. Cockles in custody: The role of common property arrangements in the ecological sustainability of mangrove fisheries on the ecuadorian coast. *Int. J. Commons* **2011**, *5*, 485–512.

35. Ostrom, E. Crossing the great divide: Coproduction, synergy, and development. *World Dev.* **1996**, *24*, 1073–1087.
36. Ostrom, E. Institutional rational choice: An assessment of the institutional analysis and development framework. In *Theories of the Policy Process*; Sabatier, P.A., Ed.; Westview Press: Boulder, CO, USA, 2007.
37. Lemos, M.C.; Agrawal, A. Environmental governance. *Annu. Rev. Environ. Resour.* **2006**, *31*, 297–325.
38. Termeer, C.J.A.M.; Dewulf, A.; van Lieshout, M. Disentangling scale approaches in governance research: Comparing monocentric, multilevel, and adaptive governance. *Ecol. Soc.* **2010**, *15*, 29.
39. Sen, A. *Resources, Values and Development*; Basil Blackwell: Oxford, UK, 1984.
40. Nussbaum, M. *Women and Human Development: The Capabilities Approach*; Cambridge University Press: Cambridge, UK, 2000.
41. Gupta, J.; Termeer, C.; Klostermann, J.; Meijerink, S.; van den Brink, M.; Jong, P.; Nootboom, S.; Bergsma, E. The adaptive capacity wheel: A method to assess the inherent characteristics of institutions to enable the adaptive capacity of society. *Environ. Sci. Policy* **2010**, *13*, 459–471.
42. Leach, M.; Mearns, R.; Scoones, I. Environmental entitlements: Dynamics and institutions in community-based natural resource management. *World Dev.* **1999**, *27*, 225–247.
43. Devereux, S. Sen's entitlement approach: Critiques and counter-critiques. *Oxf. Dev. Stud.* **2001**, *29*, 245–263.
44. Gelcich, S.; Edwards-Jones, G.; Kaiser, M.J.; Castilla, J.C. Co-management policy can reduce resilience in traditionally managed marine ecosystems. *Ecosystems* **2006**, *9*, 951–966.
45. Makalle, A.M.P. Gender relations in environmental entitlements: Case of coastal natural resources in tanzania. *Environ. Nat. Resour. Res.* **2012**, *2*, 128–142.
46. Ntshona, Z.; Kraai, M.; Kepe, T.; Saliwa, P. From land rights to environmental entitlements: Community discontent in the 'successful' dwesa-cwebe land claim in south africa. *Dev. South. Afr.* **2010**, *27*, 353–361.
47. Nunan, F. Empowerment and institutions: Managing fisheries in uganda. *World Dev.* **2006**, *34*, 1316–1332.
48. Sikor, T.; Nguyen, T.Q. Why may forest devolution not benefit the rural poor? Forest entitlements in Vietnam's central highlands. *World Dev.* **2007**, *35*, 2010–2025.
49. Glaser, M. Interrelations between mangrove ecosystem, local economy and social sustainability in Caete Estuary, North Brazil. *Wetl. Ecol. Manag.* **2003**, *11*, 265–272.
50. Việt Nam. Available online: https://wiki.hattrick.org/wiki/Viêt_Nam (accessed on 27 November 2015).
51. Orchard, S.E. *Exploring Adaptive Capacity in Mangrove Social-Ecological Systems of Rural Vietnam*; University of Leeds: Leeds, UK, 2015.
52. Gubrium, J.F.; Holstein, J.A. *Post-Modern Interviewing*; Sage Publication: Thousand Oaks, CA, USA, 2003.
53. Berg, B.L. *Qualitative Research Methods for Social Sciences*; Pearson Publications: Essex, UK, 2009.
54. Chambers, R. *Whose Reality Counts? Putting the First Last*; Intermediate Technology Publications: London, UK, 1997.

55. Twyman, C.; Morrison, J.; Sporton, D. The final fifth: Autobiography, reflexivity and interpretation in cross-cultural research. *Area* **1999**, *31*, 313–325.
56. Ritchie, J.; Spencer, L.; O'Connor, W. Carrying out quantitative analysis. In *Qualitative Research Practice: A Guide for Social Science Students and Researchers*; Ritchie, J., Lewis, J., Eds.; SAGE Publications: London, UK, 2003.
57. Sharp, L.; Richardson, T. Reflections on foucauldian discourse analysis in planning and environmental policy research. *J. Environ. Pol. Plan.* **2001**, *3*, 193–209.
58. Kaplowitz, D.; Hoehn, J. Do focus groups and personal interviews reveal the same information for natural resource valuation? *Ecol. Econ.* **2001**, *36*, 237–247.
59. Kaplowitz, D. Assessing mangrove products and services at the local level: The use of focus groups and individual interviews. *Landsc. Urban Plan.* **2001**, *56*, 53–60.
60. Agrawal, A.; Ostrom, E. Collective action, property rights, and decentralization in resource use in india and nepal. *Politics Soc.* **2001**, *29*, 485–514.
61. Weyerhaeuser, H.; Wen, S.; Kahrl, F. *Emerging Forest Association in Yunnan, China—Implications for Livelihoods and Sustainability*; World Agroforestry Center, ICRAF: London, UK, 2006.
62. Vien, T.D. *Forestland Management Policies in Vietnam: An Overview*; The Centre for Agricultural Research and Ecological Studies (CARES), Hanoi University of Agriculture (HUA): Hanoi, Vietnam, 2008.
63. Tran Thi Thu, H.; van Dijk, H.; Bush, S.R. Mangrove conservation or shrimp farmer's livelihood? The devolution of forest management and benefit sharing in the mekong delta, Vietnam. *Ocean Coast. Manag.* **2012**, *69*, 185–193.
64. Bien, N.N. *Forest Management Systems in the Uplands of Vietnam: Social, Economic and Environmental Perspectives*; Economy and Environment Program for Southeast Asia: Singapore, 2001.
65. Sikor, T. Forest policy reform: From state to household forestry. In *Stewards of Vietnam's Upland Forests*; Poffenberger, M., Ed.; Asia Forest Network: Berkeley, CA, USA, 1998; pp. 18–37.
66. Trung Thanh, N.; Bauer, S.; Uibrig, H. Land privatization and afforestation incentive of rural farms in the northern uplands of Vietnam. *For. Policy Econ.* **2010**, *12*, 518–526.
67. Van Hue, L.T.; Scott, S. Coastal livelihood transitions: Socio-economic consequences of changing mangrove forest management and land allocation in a commune of central Vietnam. *Geogr. Res.* **2008**, *46*, 62–73.
68. Ligon, E.; Narain, U. Government management of village commons: Comparing two forest policies. *J. Environ. Econ. Manag.* **1999**, *37*, 272–289.
69. Edmunds, D.; Wollenberg, E.; Contreras, P.; Dachang, L.; Kelka, G.; Nathan, D.; Sarin, M.; Singh, N.M. Introduction. In *Local Forest Management: The Impact of Devolution Policies*; Edmunds, D., Wollenberg, E., Eds.; Earthscan Publication Ltd: London, UK, 2003; pp. 1–19.
70. Thanh, T.N.; Sikor, T. From legal acts to actual powers: Devolution and property rights in the central highlands of Vietnam. *For. Policy Econ.* **2006**, *8*, 397–408.
71. Ministry of Forestry. *Ministry of Forestry, Vietnam Forestry Sector Review and Tropical Forestry Action Programme: Main Report*; Ministry of Forestry: Hanoi, Vietnam, 1991.

72. The President of the Socialist Republic of Vietnam. *The Law on Forest Protection and Development*; The XIth National Assembly of the Socialist Republic of Vietnam at its 6th session: Hanoi, Vietnam, 2004.
73. Tran Thi Phung, H.; van Dijk, H.; Visser, L. Impacts of changes in mangrove forest management practices on forest accessibility and livelihood: A case study in mangrove-shrimp farming system in ca mau province, mekong delta, Vietnam. *Land Use Policy* **2014**, *36*, 89–101.
74. De Jong, W.; Ruiz, S.; Becker, M. Conflicts and communal forest management in northern bolivia. *For. Policy Econ.* **2006**, *8*, 447–457.
75. KimDung, N.; Bush, S.; Mol, A.P.J. Administrative co-management: The case of special-use forest conservation in Vietnam. *Environ. Manag.* **2013**, *51*, 616–630.
76. United Nations Convention on Biological Diversity (UNCBD). The convention on biological diversity. Available online: <https://www.cbd.int/doc/legal/cbd-en.pdf> (accessed on 27 November 2015).
77. Government of Vietnam. *Vietnam's Fifth National Report to the United Nations Convention on Biological Diversity: Reporting Period: 2009–2013*; Ministry of Natural Resources and Environment: Hanoi, Vietnam, 2014.
78. Phuc, T.X. Why did the forest conservation policy fail in the Vietnamese uplands? Forest conflicts in ba vi national park in northern region. *Int. J. Environ. Stud.* **2009**, *66*, 59–68.
79. Nang, D. Wetlands protection and management in Vietnam. In *Wetlands Management in Vietnam: Issues and Perspectives*; Torell, M., Salamanca, A.M., Ratner, B.D., Eds.; WorldFish Center: Penang, Malaysia, 2003.
80. Hawkins, S.; Phuc, X.T.; Pham, X.P.; Thuy, P.T.; Nguyen, D.T.; Chu, V.C.; Brown, S.; Dart, P.; Robertson, S.; Nguyen, V.; et al. *Roots in the Water: Legal Frameworks for Mangrove Pes in Vietnam*; Forest Trends: Washington, DC, USA, 2010.
81. Hai-Hoa, N. The relation of coastal mangrove changes and adjacent land-use: A review in southeast asia and kien giang, Vietnam. *Ocean Coast. Manag.* **2014**, *90*, 1–10.
82. Ca, T.N. The national policy landscape: The legacy and the present situation. In *Stakeholder Agency in Rural Development Policy: Articulating Co-Governance in Vietnam*; Powell, N., Swartling, Å.G., Ha, H.M., Eds.; ICRAF Vietnam: Hanoi, Vietnam, 2011.
83. Jamieson, N. *Understanding Vietnam*; University of California Press: London, UK, 1993.
84. Nguyen, M.D. Culture shock—A review of Vietnamese culture and its concepts of health and disease. *West. J. Med.* **1985**, *142*, 409–412.
85. Van Hue, L.T. Gender, doi moi and mangrove management in northern Vietnam. *Gend. Technol. Dev.* **2006**, *10*, 37–59.
86. Gammeltoft, T. *Women's Bodies Women's Worries*; Psychology Press: Surrey, UK, 1999.
87. Rambo, T.A. *Searching for Vietnam: Selected Writings on Vietnamese Culture and Society*; Trans Pacific Press: Melbourne, Australia, 2005.
88. Vi, P.T.T.; Rambo, T.A. Environmental consciousness in Vietnam. *South. Asian Stud.* **2003**, *41*, 76–100.
89. Le, T.C. Vietnam: Traditional concepts of human relations with the environment. *Asian Geogr.* **1999**, *88*, 67–74.
90. Jamieson, N. *Culture and Development in Vietnam*; East-West Centre: Honolulu, Hawaii, 1991.

91. Rambo, A.T. Vietnam: Searching for integration. In *Religion and Societies: Asia and the Middle East*; Caldarola, C., Ed.; Mouton Publishers: Berlin, Germany, 1982.
92. Adhikari, K.P.; Goldey, P. Social capital and its “downside”: The impact on sustainability of induced community-based organizations in nepal. *World Dev.* **2010**, *38*, 184–194.
93. Ahmed, S.; Stepp, J.R.; Toleno, R.A.J.; Peters, C.M. Increased market integration, value, and ecological knowledge of tea agroforests in the akha highlands of southwest china. *Ecol. Soc.* **2010**, *15*, 27.
94. Trimble, M.; Berkes, F. Participatory research towards co-management: Lessons from artisanal fisheries in coastal uruguay. *J. Environ. Manag.* **2013**, *128*, 768–778.
95. Barnes-Mauthe, M.; Gray, S.A.; Arita, S.; Lynham, J.; Leung, P. What determines social capital in a social-ecological system? Insights from a network perspective. *Environ. Manag.* **2015**, *55*, 392–410.
96. Brooks, K. Sustainable development: Social outcomes of structural adjustments in a south australian fishery. *Mar. Policy* **2010**, *34*, 671–678.
97. Helliwell, J.F.; Putnam, R.D. Education and social capital. *East. Econ. J.* **2007**, *33*, 1–19.
98. King, A. *Managing without Institutions: The Role of Communication Networks in Governing Resource Access and Control*; University of Warwick: Coventry, UK, 2000.
99. Coleman, J.S. Social capital in the creation of human-capital. *Am. J. Sociol.* **1988**, *94*, S95–S120.
100. Adger, W.N.; Paavola, J.; Huq, S.; Mace, M.J. *Fairness in Adaptation to Climate Change*; MIT Press: Cambridge, USA, 2006.
101. Kamanga, P.; Vedeld, P.; Sjaastad, E. Forest incomes and rural livelihoods in chiradzulu district, malawi. *Ecol. Econ.* **2009**, *68*, 613–624.
102. Heubach, K.; Wittig, R.; Nuppenau, E.A.; Hahn, K. The economic importance of non-timber forest products (NTFPs) for livelihood maintenance of rural west african communities: A case study from northern benin. *Ecol. Econ.* **2011**, *70*, 1991–2001.
103. Fischer, C. Does trade help or hinder the conservation of natural resources? *Rev. Environ. Econ. Policy* **2010**, *4*, 103–121.
104. Patch, B.; Merritt, W.; Reddy, R.; Rout, S. Evaluating watershed development impacts on physical capital using household surveys and bayesian networks. In Proceedings of the 20th International Congress on Modelling and Simulation (Modsim2013), Adelaide, Australia, 1–6 December 2013; pp. 2959–2965.
105. Carter, M.R.; Lybbert, T.J. Consumption *versus* asset smoothing: Testing the implications of poverty trap theory in burkina faso. *J. Dev. Econ.* **2012**, *99*, 255–264.
106. Sabates-Wheeler, R.; Mitchell, T.; Ellis, F. Avoiding repetition: Time for cba to engage with the livelihoods literature? *Ids Bull. Inst. Dev. Stud.* **2008**, *39*, 53–59.
107. Ellis, F. The determinants of rural livelihood diversification in developing countries. *J. Agric. Econ.* **2000**, *51*, 289–302.
108. Sherman, M.; Ford, J.D. Market engagement and food insecurity after a climatic hazard. *Glob. Food Secur.* **2013**, *2*, 144–155.
109. McElwee, P. You say illegal, i say legal: The relationship between “illegal” logging and land tenure, poverty, and forest use rights in Vietnam. *J. Sustain. For.* **2004**, *19*, 97–135.

110. Motsholapheko, M.R.; Kgathi, D.L.; Vanderpost, C. Rural livelihoods and household adaptation to extreme flooding in the okavango delta, botswana. *Phys. Chem. Earth* **2011**, *36*, 984–995.
111. Barbier, E.B. *Natural Capital, Ecological Scarcity and Rural Poverty*; Policy Research Working Paper 6232; The World Bank: Washington, DC, USA, 2012.
112. VanWey, L.K.; Hull, J.R.; Guedes, G. Capitals and context bridging health and livelihoods in smallholder frontiers. *Ecol. Politics Health* **2013**, *41*, 33–54.
113. Guedes, G.R.; VanWey, L.K.; Hull, J.R.; Antigo, M.; Barbieri, A.F. Poverty dynamics, ecological endowments, and land use among smallholders in the brazilian amazon. *Soc. Sci. Res.* **2014**, *43*, 74–91.
114. Mwangi, E.; Dohrn, S. Securing access to drylands resources for multiple users in africa: A review of recent research. *Land Use Policy* **2008**, *25*, 240–248.
115. Kooiman, J.; Bavinck, M.; Jentoft, S.; Pullin, R. *Fish for Life: Interactive Governance for Fisheries*; Amsterdam University Press: Amsterdam, The Netherlands, 2005.
116. Hostovsky, C.; MacLaren, V.; McGrath, G. The role of public involvement in environmental impact assessment in Vietnam: Towards a more culturally sensitive approach. *J. Environ. Plan. Manag.* **2010**, *53*, 405–425.
117. Ostrom, E. Collective action and the evolution of social norms. *J. Econ. Perspect.* **2000**, *14*, 137–158.
118. Agrawal, A.; Ribot, J. Accountability in decentralization: A framework with south asian and west african cases. *J. Dev. Areas* **1999**, *33*, 473–502.
119. Kauneckis, D.; Andersson, K. Making decentralization work: A cross-national examination of local governments and natural resource governance in latin america. *Stud. Comp. Int. Dev.* **2009**, *44*, 23–46.
120. Mangroves For the Future (MFF). *Mangroves for the Future Phase III—National Strategic Action Plan (2015–2018)*; International Union for Conservation of Nature (IUCN): Gland, Switzerland, 2015.
121. Stringer, L.C.; Paavola, J. Participation in environmental conservation and protected area management in romania: A review of three case studies. *Environ. Conserv.* **2013**, *40*, 138–146.
122. Stringer, L.C.; Twyman, C.; Thomas, D.S.G. Combating land degradation through participatory means: The case of swaziland. *Ambio* **2007**, *36*, 387–393.
123. Pretty, J.; Ward, H. Social capital and the environment. *World Dev.* **2001**, *29*, 209–227.