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Influence of institutional arrangements on invasive plant species management from multilevel perspectives: a case study in Vietnam's national parks

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Research Article

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Abstract

Invasive plant species (IPS) management in national parks is a complex problem often characterized by the involvement of various organizations with different responsibilities, legal mandates, and jurisdictions. These institutional arrangements shape the structure, function, and decision-making behaviors of organizations and influence management effectiveness. Drawing on institutional theory, this study analyzed institutional arrangements and how these influenced IPS management in Vietnam's national parks. Data were collected between May and July 2017 using in-depth interviews with 39 key informants with responsibility for IPS management at different institutional levels (national, provincial, and local national parks). Results demonstrated that IPS management in Vietnam's national parks was characterized by centralized management with overlaps and gaps in vertical institutional relationships that limited the effectiveness of horizontal relationships. These characteristics resulted in a lack of clear guiding regulations and limited resources that restricted decision making and hindered implementation at the local national park level. The study highlights the need for a common set of principles across agencies, governed by an overarching body to promote constructive relationships across the vertical and horizontal institutional dimensions of IPS management.

Introduction

Invasive plant species (IPS) pose a globally significant and growing threat to the values that nature conservation reserves are established to protect (Clarke et al. 2021; Dayer et al. 2020; Foxcroft et al. 2017). Managing the presence and impacts of IPS in conservation reserves, such as national parks, has received considerable attention mainly from an applied ecological or biophysical perspective (Mahla and Mlambo 2019; Rodgers et al. 2018; Tan et al. 2012; Vardarman et al. 2018; Walsh et al. 2008). However, effective management of this threat is complex, often requiring cooperation and communication across multiple institutional scales, jurisdictions, and decision makers (Wilson et al. 2016). The influence of institutional dimensions on IPS management effectiveness has received relatively less attention in the scholarly literature (Graham 2019; Shackleton et al. 2016; Stokes et al. 2006; Vaas et al. 2017). Understanding the institutional dimensions at the nexus between IPS and nature conservation reserve management from the managerial perspective provides unique insights that may provide a basis for designing more effective IPS management (Foxcroft and McGeoch 2011; Schmidt et al. 2020; Shine et al. 2005).

Institutions are defined as the social rules, political structures, and legal arrangements that shape decision making and behaviors of people and organizations, referred to as "actors" (Ostrom 1990; Scott 2013). Institutions include formal dimensions, such as laws, documented responsibilities, and powers of actors; and informal dimensions, such as social and cultural norms (Helmke and Levitsky 2004; North 1990). The interaction between actors in institutional arrangements can be described along horizontal and vertical dimensions (Hollingsworth 2000; Hooghe and Marks 2003; Matheson 2000; Paavola et al. 2009). The horizontal dimension includes the interactions of different actors across sectors within the same level of jurisdiction, for example, interactions between different national government agencies or national park managers (Matheson 2000). The vertical dimension involves interactions between actors at different jurisdictional levels (Burgers and Vranken 2003), for example, between national agencies and local national park managers. The combined interactions of horizontal and vertical relationships

Management Implications

This paper critically examines the management of invasive plant species (IPS) in Vietnam's national parks from the perspective of key decision makers and managers at the national, provincial, and local national park levels. IPS management in the national parks of Vietnam is generally limited in effectiveness due to poor collaboration, limited resources, and a lack of strategic decision making and management actions at the national park level. Rather than assume the issue rests with the national park managers, it is important to explore wider evidence as to why IPS management is generally lacking. This is especially important given the national parks of Vietnam are internationally recognized as highly biodiverse and globally significant. Theory-based analysis of the IPS management institutional arrangements provides a robust method to identify and articulate key drivers influencing decision making and management actions undertaken by the responsible agencies across political and geographic scales. This in turn can provide a means of justification for proposed changes to improve decision-making and resource allocation processes that can subsequently benefit national parks through effective IPS management. In other words, using institutional theory to critique an example of IPS management and the associated agency relationships and decision-making processes can provide some insights by articulating the parameters influencing IPS management effectiveness at the national to the local level.

influence decision making, implementation processes, and ultimately, management effectiveness (Cosens 2010; Matheson 2000; Ostrom 1986).

The relative influence of the vertical and horizontal institutional dimensions and their interactions can vary according to many factors, especially the degree of centralization in government (Burgers and Vranken 2003; Lee et al. 2011). For example, a lack of clear and enforceable legislation and regulation from the national level can inhibit effective management at lower levels (Howes et al. 2017). Furthermore, the involvement of multiple actors across the horizontal dimension with poorly defined responsibilities may result in gaps or overlaps of responsibilities (Ho et al. 2014; Jordana and Sancho 2004; Matheson 2000). This in turn can result in ineffective management. However, strictly delineated sectoral responsibilities can create administrative silos and interagency conflicts as agencies focus on their target objectives (Jacob and Volkery 2004; Steurer 2007). Conflicts across the horizontal dimension can be challenging to solve if there is a lack of effective top-down legislation and guidance to achieve common objectives (Nunan et al. 2012).

This paper explores the institutional dimensions of IPS management in Vietnam's national parks. The paper focuses on the decision-maker and managerial perspectives in a predominantly top-down and centralized governance system. The perspectives of decision makers and managers can provide detailed insights into the strengths and challenges of management from an insider's viewpoint (Schmidt et al. 2020). Specifically, the paper addresses the following questions: (1) to what extent has a centralized, top-down approach successfully enabled effective management of IPS at the local level? (2) Have interactions between the vertical and horizontal dimensions of institutional relationships influenced the management effectiveness of IPS in national parks? The following sections provide background and context for understanding the institutional structures influencing Vietnam's IPS and national park management.

Vietnam's National Parks

Located in the Indo-Burma biodiversity hotspot, Vietnam is ranked as the 16th most biodiverse country globally (Mittermeier et al. 2004). However, the number of species in Vietnam has declined considerably in recent decades (Pilgrim and Tu 2007). Beginning in the 1960s, national parks were established for forest restoration and protection as one of the responses by the Vietnamese government to conserve biodiversity (Decree 117/2010/ND-CP). To date, Vietnam has established 34 national parks with a total area of more than 12,000 km^2. However, since the early 21st century Vietnam's national parks have been increasingly threatened by IPS (Tan et al. 2012). For example, the invasion of the exotic giant sensitive plant (*Mimosa pigra* L.) in Tram Chim National Park not only quickly replaced natural vegetation but also caused a marked decline in the population of the iconic eastern Sarus crane (*Grus antigone sharpii* Blanford), designated as vulnerable on the IUCN Red List (IUCN 2021; Triet et al. 2004). Recently, some invasive native species have also impeded restoration goals for national parks in Vietnam, including *Merremia boisiana* (Gagnep.) Ooststr. and *Merremia eberhardtii* (Gapnep.) T.N. Nguyen (Hoe 2011; Le et al. 2012), and *Microstegium ciliatum* (Trin.) A. Camus (Truong et al. 2021). While IPS represent a significant threat to Vietnam's national parks, they have received little research attention in Vietnam (Truong 2019). Consequently, the extent of the problem is likely greater than indicated by the scientific literature. In addition to the limited research effort, it has been noted that the development and implementation of effective IPS management is lacking in Vietnam's national parks and forests (Tan et al. 2012).

Vietnam's National Parks and IPS Management Institutional Context

In Vietnam, IPS and national parks are ultimately the responsibility of the national government as a part of a centralized and state-controlled system (KimDung et al. 2017). Figure 1 illustrates how responsibilities for IPS and national parks are separated into two top-down management systems: a national park management system under the responsibility of the Ministry of Agriculture and Forestry (MARD); and an invasive species management system under the responsibility of the Ministry of Natural Resources and Environment (MONRE). The relevant Provincial People's Committee (PPC) governs national parks within a single provincial jurisdiction. National parks that fall across provincial boundaries are the direct responsibility of the national agency (MARD). While Vietnam has a centralized system of government, some decentralization has occurred. Provincial and local government agencies have some autonomy regarding nature conservation and IPS management in their own regions. The Department of Natural Resources and Environment (DONRE) assists PPCs with the implementation of IPS management in general (Figure 1). The Department of Agriculture and Rural Development (DARD) (specifically the Sub-Department of Forest Protection), manages specific-use forests in the province on behalf of PPCs, including prevention and control of IPS in the forestry sector. Both DONRE and DARD are officially under their national ministries (MONRE and MARD, respectively), but are directly accountable to the PPCs (ICEM 2003).

However, while some autonomy is evident at the local level, there is a reliance on financial resources allocated by the national ministries to implement management actions (De Queiroz et al. 2013). These institutional structures associated with IPS and

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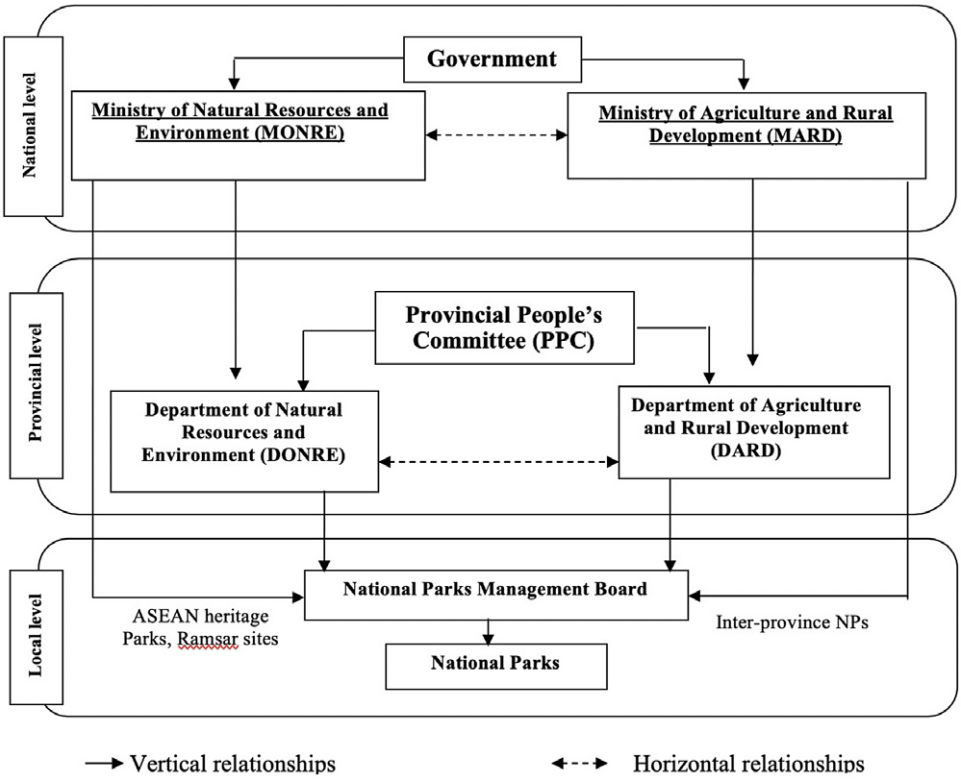

Figure 1. Formal institutional structure of lead agencies involved in invasive plant species management in national parks in Vietnam.

national park management have been characterized as a fragmented policy framework in which responsibilities are often unclear (De Queiroz et al. 2013; ICEM 2003; KimDung et al. 2017).

Materials and Methods

Semistructured, in-depth interviews were conducted with a purposive sample of state and non-state actors managing national parks and IPS in Vietnam. Purposive sampling was used to obtain the range of perspectives on IPS and national park management along both horizontal and vertical institutional dimensions. The in-depth interview method was used to capture the range and nuance of perspectives regarding a complex issue, in this case, the institutional structures and relationships associated with IPS management in national parks (Given 2008; Henwood and Pidgeon 2001; Hughes et al. 2016; Humair et al. 2014; Kokotovich and Andow 2017; Schüttler et al. 2011; Selge et al. 2011).

Interview participants were identified and invited based on Vietnam's organizational structure for IPS and national park management (Figure 1). The aim was to obtain a cross section of key actors who had direct responsibilities to manage IPS and national parks at the local, provincial, and national scales. The sample included senior government managers and individuals working in the research sector and non-government organizations (NGOs) involved with IPS and national park management.

Interview Design

A semistructured interview consisting of open-ended questions was designed to enable participants to express and elaborate on their views without being constrained by predetermined responses (Neuman 2013). An interview guide was used with a series of points grouped into three parts (see Supplementary Material for interview questions). The first part of the interview described the role of the interviewee, and IPS issues in his/her geographic area of responsibility. The second part is the main part of the interview, with a focus on the status and outcomes of IPS management programs. Particular attention was paid to opinions relating to responsibilities, information sharing, and cooperation among key actors, and how they affected IPS management programs. Finally, the interview invited participants to make recommendations on the policy and management of IPS (Supplementary Table S1).

The Interview Process

The interviews were conducted in Vietnamese in Vietnam from May to July 2017. When possible, the interviews were face-to-face, semistructured discussions. However, due to time and travel distance limitations, in some instances the questions were sent via email and followed up with phone interviews with some managers of national parks. Face-to-face interview duration varied from half an hour to 2 hours or more, with most interviews being about an hour. The time variation was dependent on the extent to which respondents elaborated on the questions during the interviews. If the interviewee gave consent, audio recordings were made. If interview participants preferred not to be audio-recorded, detailed written notes were taken during the interviews.

Data Coding and Processing

Interviews were transcribed in Vietnamese and then translated from Vietnamese to English by one of the researchers who is fluent

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Table 1. List of coded participants interviewed on invasive species management.

Participant group	Number of respondents interviewed	Interviewee code
National level	5	N1–N5
Provincial level	8	P1–P8
National parks (local level)	18	NP1–NP18
Individual researchers	6	R1–R6
Non-government organizations	2	O1, O2
Total	39	

in Vietnamese and English. Content analysis was conducted using manual coding to identify the main topics and key issues based on frequencies of words grouped by similar meanings. The key issues were then aggregated into common emergent themes grouped by topic (Elo and Kyngäs 2008). Data coding and processing procedures were moderated, with each researcher coding interview responses independently then cross-checking as to minimize bias.

Results and Discussion

Thirty-nine interviews were conducted (100% response rate); 31 interviewees were government employees directly responsible for IPS management (at the national and provincial levels and on national park management boards), while 8 interviewees were researchers at universities, research institutes, and non-government entities (Table 1).

In terms of the situational context for IPS management in Vietnam's national parks, 11 (out of 18) interviewees managing national parks stated that their parks had no programs focused on managing IPS. Seven interviewees at the local level noted they had conducted some limited opportunistic management of IPS such as removal (NP10, NP11, NP12, NP14), community education (NP16, NP17) or surveying IPS in the parks (NP12, NP13).

The emergent themes of vertical and horizontal dimension relationships influencing the effectiveness of IPS management in Vietnam's national parks are summarized in Table 2 and described in the following sections.

Table 2. Emergent themes relating to vertical and horizontal relationships influencing invasive plant species (IPS) management in Vietnam's national parks.

Key IPS management themes	Total	
	Number of respondents	Percentage $n = 39$
		%
Vertical institutional relationships		
Legislation and regulation	21	53.8
• Insufficient legislation and regulation	19	48.7
• Inappropriate legislation	5	12.8
Limited resources to manage IPS at local levels	27	69.2
Horizontal institutional relationships		
Responsibility	20	51.2
• Overlapping responsibilities	11	28.2
• Gaps in priorities for responsibility implementation	10	25.6
• Unclear responsibilities	11	28.2
Collaboration	27	69.2
• Variable degrees of interagency collaboration	24	61.5
• Variable support from national level	10	25.6

Vertical Institutional Relationships

A common theme emerging from the interviews related to insufficient and inappropriate legislation and regulations at the national level limiting resourcing and decision-making capability for effective IPS management at the local national park level. This was observed by respondents at all institutional levels, suggesting a common institutional recognition of the limits of IPS management in Vietnam's national parks. The constraints of Vietnam's institutional arrangements have been previously documented and are characteristic of a centralized and state-controlled system (KimDung et al. 2017; Waibel 2010; Zingerli 2005). The IPS management challenges identified by interviewees in the context of the vertical institutional dimensions are discussed in the following sections.

Insufficient Legislation and Regulations

Interviewees at all institutional levels commented that national government–level legislation and associated regulations for managing IPS were insufficient. At the national level, this was framed in the context managing environmental risk. For example, representatives at the national level stated that legislation is insufficient for effective environmental risk assessment of IPS (N1, N5):

> [The] Biodiversity Law has only five articles (50–54) related to management activities but no specific articles on risk assessment. So, there is no legal basis to build regulations on risk assessment. (N1)

Interviewees at the provincial level made similar observations that IPS management effectiveness was limited by inadequate national laws and regulations (P5, P6). For example, one interviewee noted there were responsibilities assigned from the national level to the provincial level (DONRE) on IPS management in a Joint Circular (No. 50/2014). However, there was no legislation enabling the associated allocation of resources (P5). Another commented:

> The [national] Ministry does not have explicit regulation[s] regarding the need for a specialized division or expert staff [for IPS management] . . . [as a consequence] . . . monitoring and control is not regulated and guided. (P6)

These reported legislative issues limiting IPS management effectiveness reflect the characteristics of legislation more generally in Vietnam in terms of a lack of clear regulations for the interpretation and implementation of laws (Lien 2011).

Interviewees at the local national park level also perceived a lack of clear legislation, regulations defining clear responsibilities, authority, and resource allocation for a range of IPS management actions, including evaluating IPS (NP5, NP17), early detection and rapid response (NP7), risk assessment (NP7, NP11, NP15), and sanctions for a specific behavior (NP7). For example, a non-government interviewee commenting about national park managers noted: "It is true that if there is no legal document regulating their specific responsibilities, they will not do it" (R6).

Inappropriate Legislation

Issues with inappropriate legislation were mentioned at all institutional levels, particularly regarding the management of special-use forests established for ecosystem maintenance and biodiversity conservation (N2, N3, R4, P3, P11). Strict regulation associated

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with the special-use forests prohibits any human activities within the protection zones. These restrictions were seen to cause difficulties for activities focusing on controlling IPS (NP3, NP11, NP10, NP14, P15). For example:

> Decree 117 and 186 do not allow any actions on the strict protection zone. Any action must be reported and submitted to the Ministry [for approval]. This is very time-consuming and results in delaying control of invasive species. (NP11)

National-level MARD representatives (N2, N3) also acknowledged that this is a limitation for IPS management in national parks.

> There were some proposals sent to MARD to ask for the funds to control invasive species. But after several meetings, it was rejected due to [the national park] being classified into special-use forests, which are prohibited from having any intervention. (N2)

This example highlights a situation in which legislation designed to protect biodiversity is associated with a perverse policy outcome in which IPS management is stymied, hence threatening the biodiversity values the decree seeks to protect. This perverse policy outcome can be explained by the centralized, top-down characters of institutional relationships regarding management of IPS in Vietnam's national parks. Strongly centralized decision making and resource allocation restrict the scope and flexibility for decision making and resource allocation at lower levels in the hierarchy (Ruijer 2012). In addition, limited vertical policy coordination and communication between the policy makers at the "top" and the implementers at the "bottom" can result in impractical policy decisions and ineffective implementation (Adam et al. 2019). Ideally, perverse outcomes could be minimized by effectively enabling bottom-up feedback and information about the effects of policies on the ground (Adam et al. 2019; Lindquist 2006).

Limited Resources to Manage IPS at the Local Level

Provincial- and local-level respondents identified insufficient and inappropriate national legislation as a cause for inadequate resourcing and subsequent inconsistencies in IPS monitoring and management at the local level (N1, P3, P5, P6). The local-level interviewees reported that limited resources available at the provincial level meant that while some provinces could prioritize resources for IPS monitoring and management in national parks (NP10, NP12), other "poorer" provinces tended to prioritize economic development issues that were often considered more pressing than IPS management (NP2, NP3, NP11, P3, P5).

It was noted by a national-level respondent (N1) that national-level ministries do not directly fund local IPS management programs; in fact, controlling funding is mainly allocated to local-level national parks from the provincial budget. The national-level interviewee explained that IPS monitoring and management varied significantly between provinces due to the differences between provincial budgets and resource allocation priorities. However, limited IPS management resource allocation at the local national park level in Vietnam is associated with generally poorly coordinated and limited central government support for national park management (de Wit 2007; Fritzen 2006; ICEM 2003; Vo 2005; Zingerli 2005).

In this regard, all provincial-level DONRE interviewees (P3, P4, P5, P6, P7) considered inadequate laws at the national level as limiting funding for staff, a key resource for managing IPS. Limited staffing and sporadic funding availability can lead to an ad hoc, short-term approach to IPS management (Shackleton et al. 2020). Short-term and ad hoc decision making results in a higher risk of IPS spreading and impacting national parks (Jauni and Ramula 2017; Kleinschroth and Healey 2017; Lozon and MacIsaac 1997). As one interviewee at the provincial level commented in relation to the limited staff and capacity for effective and strategic decision making: "There is only one staff [member] in charge of many tasks including IPS, [there is] no specialization" (P4).

At the national park level, limited staffing meant that monitoring patrols carried out by forest rangers were constrained to specific areas, making it difficult to detect IPS in unpatrolled areas (NP11). Furthermore, a number of interviewees indicated that limited staffing and resourcing for national parks impacted by IPS restricts management to cheaper, manual removal of IPS, which was considered inefficient and ineffective for permanent management (N2, N3, NP10, MP18, R2). It is well recognized that effectively managing and eventually removing IPS requires significant financial and human resources, beyond manual removal (Ma et al. 2018; Schwörer et al. 2012; Tobin 2018).

Horizontal Relationships and Responsibilities

Overlapping Responsibilities

One of the perceived problems with IPS management in Vietnam's national parks, mentioned by 11 interviewees, was related to overlapping responsibilities at the national institutional level. National government interviewees noted that MARD and MONRE have roles in biodiversity conservation and IPS management but implement their roles under different laws (N3). The respective laws overlap but define IPS differently, causing conflicts in IPS management (N1). While MONRE defines IPS as invasive alien species with focus on international origins and impacts on biodiversity, MARD considers IPS in terms of impacts to agriculture irrespective of the place of origin.

Three interviewees (N5, R1, R4) mentioned one example related to a national IPS identification list (Circular 22/2011) devised by MONRE in 2011, but MARD disputed the list, as some of the species were considered important for agriculture (e.g., quinine tree [*Cinchona pubescens* Vahl.]) and herbal resources (e.g., guava [*Psidium guyava* L.]) in many provinces. Thus, compromise, negotiated over several years, was required to devise a modified list that MARD and MONRE could agree upon (Joint Circular 27/2013). Overlapping responsibilities are typical in horizontal relationships and have been observed as a limit to effective management in Vietnam (Gilfillan et al. 2017). In particular, overlapping responsibilities between national agencies in Vietnam have previously been associated with poorly defined or inconsistent legal mandates and objectives for management agencies farther down the hierarchy (Ho et al. 2014). Consequently, overlapping mandates can create a lack of clarity in responsibilities that ultimately hinders collaboration effectiveness in controlling the introduction and spread of invasive species (Kaiser 2006; Schelhas et al. 2021).

Gaps in Invasive Native Species Management and IPS Risk Assessment

Gaps in IPS management were reported in relation to including native species on the official list of IPS (Circular 27/2013). Some interviewees (R5, R6, NP11, NP13, NP15) stated that many native species have spread in national parks, such as the invasive native vines *Merremia* spp., and posed a similar risk as invasive alien plants and therefore should be included on the IPS list. Others

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argued that the list is explicitly for invasive alien species, so native species should not be included (N1, R3, R4, O1).

Interviewees from the national level (N5) and the non-government sector (O1) both commented that invasive native plant management was not the responsibility of MONRE, as MONRE was guided by the Convention on Biological Diversity (CBD), which only focuses on invasive alien species. Meanwhile, MARD prioritized crop pests rather than invasive species in forests, including both native and non-native species.

Differences between MONRE and MARD in definitions of IPS and management approaches result in gaps where IPS are not effectively managed on the ground. A MARD representative also highlighted the different scopes of IPS management between the agencies, which resulted in gaps in risk assessment.

> The risk assessment of invasive plants is only a small part of the procedure because our goal, . . . is not to prevent the invasion risk from the beginning to the end but to assess the risk of becoming a plant pest or a threat to plant quarantine . . . MONRE said that they are disadvantaged because it is [a] one-sided [approach]. Yes, because we cannot jump into the other playground. (N5)

The differences in IPS management mandates may be partly explained by the influence of overlapping international conventions (Ikin 2002; Lopian 2005; MacLeod et al. 2010; Secretariat of the Convention on Biological Diversity 2001). For example, both the CBD and International Plant Protection Convention (IPPC) address the management of invasive species, but with different concerns (Lopian 2005). Government environmental agencies implementing the CBD are required to assess the likely impact of introduced organisms on ecosystems, habitats, or species. Hence, the primary interests of environmental agencies are the local environment and compliance monitoring rather than external forces like quarantine service (Ikin 2002). Meanwhile, activities coordinated by the IPPC emphasize measures against organisms (pests) that primarily affect crops (Ikin 2002; Lopian 2005). Quarantine services, although incorporating consideration of environmental effects of introduced species, are run by agricultural agencies. Therefore, the implementation of measures to prevent the introduction of invasive plants into the Pacific tends to prioritize agricultural pests (Ikin 2002).

Because MONRE and MARD are focus points for CBD and IPPC, respectively, in Vietnam, conflict and duplication of invasive species management under different conventions are unavoidable, as in many Pacific Island countries (Ikin 2002). This leads to a situation in which both national ministries manage invasive species that are considered a threat, but specific priorities regarding the extent and type of threat are different. MARD, which has a system of pest management from quarantine to control, affords limited priority to IPS in national parks and conservation reserves. Meanwhile, MONRE, with responsibility for invasive species management for biodiversity conservation under CBD, lacks human resources as well as an operational system for quarantine and assessing the impacts of invasive species, particularly invasive native species. Consequently, this situation creates gaps in identifying and assessing impacts and monitoring invasive species, as mentioned by respondents at the national level.

Indistinct Delineation of Responsibilities

Interviews with provincial-level representatives revealed that responsibilities for IPS management were not clear-cut due to the ill-defined mandates issued by DONRE and DARD. Indistinct delineation of responsibilities reportedly led to the shifting of blame between agencies in some provinces. All representatives from DONRE (P3, P4, P5, P6, P7) stated that they generally had not implemented any IPS management in national parks, as the DONRE representatives considered that IPS management should be entirely the responsibility of DARD. As one DONRE representative commented: "The problem of biodiversity management was just passed to us . . . . Forest biodiversity management is currently managed by DARD, so let DARD manage [it]" (P3).

Meanwhile, a DARD representative argued that DARD only manages the agriculture–forestry sector in the province. This interviewee believed that the governing body for IPS management is DONRE, while DARD only implements according to DONRE's plans (P2). These findings support past research highlighting the lack of clarity surrounding roles and responsibilities of MONRE/DONRE and MARD/DARD at both national and provincial levels in Vietnam, which leads to confusion at the local level, particularly at national parks, and affects the actual implementation of the biodiversity and forest laws on the ground (Forest Trends 2013; Wyatt et al. 2012).

This is an example of a lack of clearly defined responsibilities resulting in each agency shifting responsibility to the other (Ho et al. 2014). Such a situation gives rise to inconsistent actions due to no specific and consistent responsibilities being defined for the local level of management (Jordana and Sancho 2004). Also, ministries and higher levels in the institutional hierarchy can dominate horizontal collaboration at lower levels in their vertical hierarchy (Christensen et al. 2015), because each national ministry focuses on its specific sectoral policies, which then define the focus of the respective subordinate agencies (Mendes 2013).

Horizontal Relationships and Collaboration

At the national level, cooperation between MONRE and MARD, the main bodies responsible for IPS, was considered to be limited (N1, N2, R1, O1). Sharing of information between the two ministries was "not only weak but very weak" (MARD representative, N2). Respondents from MONRE and MARD mentioned that the different mandates and priorities limited collaboration between the agencies (N1, N2, N5). Interviewees from the research sector (R1) and an NGO (O1) also mentioned the limitations in collaboration and information sharing on IPS management between MARD and MONRE.

The limited horizontal collaboration at the national level contrasted somewhat with horizontal collaboration at the provincial level. At the provincial level, collaboration between DARD and DONRE was considered by interviewees to be more constructive. Five of the eight interviewees at the provincial level said that they had good interagency cooperation. For example, one provincial representative of DONRE stated: "The coordination is very good. If we ask them [DARD] to provide the information they will do it" (P7).

The horizontal coordination between DONRE and DARD was relatively more positive than at the national level. This is mainly because both agencies are under the direct management of the same PPC in each province, which acts as a type of overarching management body at the provincial level. Hence, the operation is directed toward the common goals of the province (Waibel 2010).

Given the evidence of more effective collaborations at the provincial level due to the presence of the PPC as an overarching body, it seems that the establishment of an overarching national body to coordinate IPS management may help promote more effective collaboration between agencies at the national level. Without an

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overarching coordinating body for IPS, the absence of formal agreements between agencies can result in poor cooperation at the same institutional level potentially impacting lower institutional levels (Ho et al. 2014; Jacob and Volkery 2004). In this regard, effective collaboration in horizontal relationships needs to be solved through negotiation and relies more on a certain level of trust if there is a lack of a formal agreement (Matheson 2000). Hence, establishing an overarching national body may counter the influence of vertical institutional limitations and may facilitate constructive horizontal collaborations and resource allocations for IPS management at the local level (Schmidt et al. 2020; Wallace 2009). Effectively harnessing existing local resources and facilitating local decision making within a broader collaborative strategic framework are considered as fundamental for IPS management and associated biodiversity conservation in national parks (Abrams et al. 2009; Sievanen et al. 2011).

This paper explored managerial and decision-maker perspectives of IPS management effectiveness in the national parks of Vietnam, drawing on institutional theory. As a form of natural resource management, effectively managing IPS in national parks ideally requires strong collaboration and strategic decision making across agencies and areas of responsibility (Gelderblom et al. 2003; Kim et al. 2015; Reyes-García et al. 2014). Understanding the dynamics of institutional relationships is integral to understanding the status of collaborative decision making and management in terms of the extent of functionally and how this may be improved for effective IPS management (Wells 1998).

In-depth interviews with key decision makers and managers across the vertical and horizontal institutional dimensions indicated that IPS management in Vietnam was considered limited with often ineffective implementation at the local national park level. This was considered to relate to a top-down approach wherein unclear and overlapping responsibilities associated with the horizontal relationships at the national level negatively influenced resource allocation and IPS decision making and management down the vertical institutional dimension to the local level.

Through analysis of the interaction between vertical and horizontal dimensions in the context of IPS management in national parks, this study highlights how institutional arrangements influence the implementation of a complex issue. Understanding the dynamics of vertical and horizontal relationships can help identify how responsibilities and resources may be effectively allocated, and collaboration improved for IPS management and biodiversity conservation. As highlighted, biodiversity management, especially in the case of IPS, is a complex multidimensional institutional issue. In this regard, Berkes (2002: 293) notes that "neither purely local-level management nor purely higher-level management works well by itself."

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/inp.2022.16

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