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Local Government's Resource Commitment to Environmental Sustainability: Capacity, Conservatism, and Contractual Dynamics

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Abstract

Local governments are leading sustainability efforts through a range of initiatives, often voluntarily. While a spate of research exists to explain what drives these voluntary decisions, we are still limited in understanding how localities follow through with the resources to implement their adopted plans. This is particularly the case for environment and climate protection programs that are transboundary in nature and thus require more innovative and longer-term approaches than those that are relatively low-cost and easier to implement with future savings. This research examines local investment in promoting three of these program areas: air quality, biodiversity preservation, and ecological restoration. It investigates how local governments vary according to resource commitment and what factors explain those variations. We find several factors significant, including community capacity, political ideology, and institutional arrangements for service production and delivery. Variations are, however, found across different types

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of resource commitment, suggesting a more complex picture of local resource availability for advancing sustainability efforts.

Keywords
environmental sustainability, local governments, regional governance, resource commitment

Introduction

Local governments who make decisions on forestation, waste management, land use, and transportation, have emerged as crucial players in sustainability management (Carley et al. 2013; Park and Krause 2021). Localities also lead innovation in regional environmental initiatives, despite a strong free-rider incentive and a lack of enforcement from the central government (Rosenzweig et al. 2010; Zahran et al. 2008). Research has thus sought to understand why localities would pledge themselves to promote sustainability efforts, often voluntarily and without clear mandates or incentives, and identifying a range of institutional and non-institutional factors that drive voluntary adoption (Deslatte and Stokan 2019; Hill et al. 2012).

Recently, however, a number of researchers have questioned the degree to which local governments are actually dedicating resources to fulfilling their sustainability pledges, or whether these goals remain largely symbolic (e.g., adoption of sustainability plans, joining sustainability networks) (Krause 2011; Walker and Brammer 2016). Concerns are also rising about their tendency to target low-hanging fruit or low-cost, easy-to-implement solutions with imminent economic returns, such as energy efficiency programs like retrofits (Hawkins et al. 2016). Many environmental and climate protection programs require long-term and innovative perspectives that resist spatial and temporal boundaries, yet little is known about local investment in these programs. If we are to provide an accurate and comprehensive picture of local sustainability efforts, it is critical to understand to what degree localities vary in their decision to allocate resources to these program areas and what might explain these variations (Barrutia and Echebarria 2015; Portney 2013). Having a solid resource base for implementation is not only a prerequisite for effective achievement of policy goals but can also signal localities' intent to take the environment protection seriously. It can therefore offer an accurate proxy for gauging localities' commitment to environmental sustainability.

This research aims to answer this question. It explores how localities are varyingly committing human and financial resources to their sustainability efforts and, more importantly, what institutional and non-institutional

factors are associated with an increased level of resource availability. We operationalize resource commitment in various ways—we not only examine overall sustainability staffing and budget size but also investigate resources expended on air quality, biodiversity preservation, and ecological restoration in order to differentiate them from general maintenance programs, such as recycling or sewage treatment. We also employ several continuous measures from administrative data to operationalize the varying degree of resource commitment across localities, in contrast to most studies that primarily rely on a binary measure from survey. In the latter case, localities with dedicated resources are all captured in a single dichotomous (yes or no) response category despite a wide range of variations among them.

This article proceeds as follows. It first describes how local sustainability arose as a major phenomenon attracting significant research attention. It then reviews the contribution and the limitation of the current literature, highlighting the importance of understanding localities' resource disparity in advancing environmental policy goals. Next, we discuss major factors shown to influence local sustainability and test which of these helps explain their implementation efforts. Policy implications of the findings as well as suggestions for future research are discussed.

The Rise of Local Sustainability

Local governments are addressing more and increasingly daunting challenges (Sharp, Daley and Lynch 2011). Especially in the current era of devolution, often without statutory mandates and matching grants from upper governments, localities face pressure to take the lead on major policy problems and meet the heterogeneous needs of their communities. Despite the challenge, localities have repeatedly shown themselves to be pivotal partners in multi-level governance (Svara and Watt 2013) and engines of economic, environmental, and social transformations (Katz and Bradley 2013; Portney and Berry 2010).

Sustainability is a fairly broad concept, encompassing and balancing environment, economy, and equity, all closely interrelated but, at times, in conflict. The tradeoffs necessary to achieve conflicting sustainability goals are well-documented (Park and Krause 2021; Zeemering 2009). For example, one local community may invest primarily in economic growth at the expense of the environment (e.g., land resources), while another may prioritize conservation and protection, potentially slowing progress towards economic goals. Environmental contexts vary significantly: each local government may face distinct challenges in reconciling different sustainability dimensions and thus may opt to prioritize one dimension over

another (Cho and Melisa 2021; Dempsey et al. 2011). Given the triple bottom line approach, many argue that this prioritization hinders the comprehensive achievement of community sustainability and reflects political skewing and stakeholder bias (Berke and Conroy 2000; Taylor and Klenk 2019). Others suggest that previously under-appreciated dimensions of sustainability, most notably environmental issues, should be pursued disproportionately in local service delivery to balance each aspect (Lowndes and Pratchett 2012).

Empirical work has largely neglected this variation of emphasis among local governments, although there appears to be a tendency for localities to consider the environmental dimension of sustainability secondary to the other two, especially the economy (Deslatte and Swann 2020). While some environmental goals, such as energy efficiency and smart growth, provide clear and immediate benefits that span environmental, economic, and social dimensions, others face uncertainty about economic returns, spillovers, and free-riding problems. Air pollution, water quality, and ecological restoration, for example, may require upfront investment without immediate outcomes. Externality issues–both negative and positive–further disincentivize local jurisdictions in making solo investments without serious cooperation from other jurisdictions (Krause 2011; Sharp, Daley and Lynch 2011). From the perspective of the rational model, which describes governments as self-interested economic agents looking to maximize utility, these concerns would prevent pushing environmental issues to the top of the policy agenda in most localities (Holzinger and Knill 2004; March and Simon 1958; Potoski 2001).

Despite these apparent challenges, localities arose as de facto leaders in advancing environmental sustainability in the U.S. and other developed countries, often voluntarily taking on sustainability initiatives (Hawkins and Wang 2013; Saha and Paterson 2008). Numerous studies describe cases in which local governments adopted sustainability programs and initiatives despite federal or central government inaction. In other cases, regulatory cooperation established through inter-governmental agreements created a "race to the top," in which sub-national governments voluntarily conformed to higher levels of environmental standards (Holzinger and Knill 2004). Research has identified a host of factors that affect local sustainability adoption, including interest groups (Daley, Sharp and Bae 2013; Ramirez de la Cruz 2009); government institutions and problem severity (Krause 2011); resources (Homsy and Warner 2015; Wang et al. 2012); political climate (Portney and Berry 2016); forms of government operations (Svara and Watt 2013); and external pressure (Huang, Welch and Corley 2014). Building from this base, this research aims to advance the understanding of factors promoting local environmental sustainability. Still, we depart from previous studies by examining actual resources

—both human and financial—devoted to sustainability programs as a proxy for commitment to sustainability.

Local Commitment to Environmental and Climate Protection

Resource availability can help a locality create the institutional context necessary for advancing sustainability goals. Generally, it is expected that governments with more resources are better equipped to pursue and implement policy innovations (Walker 1969). A number of researchers found resources to be a direct and significant predictor of environmental outcomes or a mediator that provides the key managerial capacities necessary for effective sustainability implementation, including stakeholder engagement, performance measurement, and cross-departmental collaboration (Homsy and Warner 2015; Park, Krause and Hawkins 2021). Therefore, understanding what enables local governments to commit resources to follow through on their sustainability goals is important, especially for environment and climate protection programs that tend to require long-term perspectives on economic returns and an innovative approach to dealing with transboundary issues (Laurian, Walker and Crawford 2017).

While the evidence of local adoption of various sustainability goals has been promising, some have voiced concerns about "greenwashing" (Betsill and Bulkeley 2007; Grant, Beed and Manuel 2018). Local governments may appear to champion environmental sustainability issues without dedicating sufficient staff and financial resources. For example, according to the 2015 International City/County Management Association (ICMA) Local Government Sustainability Practices Survey, only 43.1 percent of respondent localities have sustainability staffing (including 9.3 percent with a task force instead of dedicated personnel). Financial resources are further constrained—only 18.6 percent of respondents reported a dedicated budget line item specifically for sustainability or environmental protection. A recent nationwide survey also revealed similar trends—46 percent with dedicated staffing and 22.1 percent with a dedicated budget (Krause, Hawkins and Park 2021).

Other studies found that localities prioritizing more universally-accepted environmental goals tended to invest fewer resources in sustainability initiatives (Hawkins et al. 2016). Research, therefore, increasingly highlights the need to examine if and to what extent local governments follow through with the necessary resources to realize their environment protection pledges (Aall, Groven and Lindseth 2007; Walker and Brammer 2016). Given this significance, we examine the varying degrees to which local governments allocate resources to building environmentally sustainable communities and what institutional and non-institutional factors affect these decisions.

Study Context

We conducted this inquiry in the context of South Korea localities. In South Korea, environmental sustainability became a major policy priority in the late 1980s (Kim 2011), leading to the Framework Act on Environmental Policy in 1991 and the creation of the Ministry of Environment in 1995. While economic liberalization in the 1980s underpinned this period of rapid growth, multiple environmental and industrial disasters in the mid-1980s and early 1990s, such as toxic chemical spills from upstream industrial zones and subsequent contamination of drinking water, resulted in public criticism of the government's lack of coordination on environmental issues (Im and Cho 2011; Jeong 2007). Rising public awareness of environmental sustainability coincided with South Korea's democratization and decentralization movement in the 1980s and 1990s and the growth of civil society (Cho 2017). Environmental protection activist groups, such as the Korea Federation for Environmental Movements, forced at least 16 pieces of environmental protection legislation (Kim 2011; Lim and Tang 2002), including the Clean Air Conservation Act of 1990, the Water Quality and Ecosystem Conservation Act 1990, the Environmental Dispute Adjustment Act 1990, the Act on Control of Transboundary Movement of Hazardous Wastes and Their Disposal 1992, the Natural Environment Conservation Act 1992, and the Soil Environment Conservation Act 1995.

Primary responsibility for enforcing national environment laws and for implementing sustainability policies is decentralized to local governments in South Korea (Im et al. 2014; Kim 2011); the central government's responsibility is to develop a comprehensive national plan. South Korea is made up of 17 first-tier regional governments (provinces *Do* and metropolitan areas *Cities*), subdivided into 226 second-tier local governments (localities in non-metropolitan areas *Si*, counties in rural areas *Gun*, and autonomous districts in metropolitan areas *Gu*), which are the levels of analysis in this study. Local government heads and council members are elected by direct popular votes for a four-year term. According to Article 4 of the Framework Act on Environmental Policy, each local government must develop and execute its own *Si/Gun/Gu* environmental sustainability plan according to the regional characteristics of the jurisdiction and must maintain environmentally sustainable conditions in collaboration with the Minister of Land, Infrastructure, and Transport. Regional governments (*Cities/Do*) are authorized to enforce their own environmental and health standards beyond the national requirements.

Kim (2011) suggested that South Korea offers a natural experimental setting, in which the environmental regulatory system is a combination of centralized environmental rule-making and decentralized implementation (or enforcement); further, local-to-local variation in the levels of sustainability

efforts can be tested without considering differences in unique legal or regulatory environments. Ministerial decree (of the Ministry of Environment) specifies that local governments are authorized to enforce regulatory rules on air quality, water, chemical waste, and pollutant emissions in their jurisdiction. Local governments must manage ecological restoration and biodiversity preservation, including formulation and implementation of natural environment conservation measures, construction of ecological habitation spaces, enforcement of measures necessary for the restoration of ecosystems, and the recruitment of private organizations and businesses to enhance biological diversity. Localities form an important axis in South Korea's 2050 Carbon Neutral Strategy, also known as the Green New Deal project, to actively participate in the international movement for Net Zero by 2050 pledge. By investigating the factors that influence local resource commitment to environmental issues in South Korea, we expect to contribute to an empirical understanding beyond the U.S., or "Western," context. While budgets reflect the priorities of a local government, path dependence also influences these kinds of decisions (Stokan, Deslatte and Hatch 2021). Therefore South Korean context is especially useful to explore what they decide how to "re-allocate" or move resources from pre-existing programs as the fiscal authority of South Korean local governments is limited in terms of increasing or decreasing the total volume budget or staff.

Research Hypotheses

Capacity: Resource Dependency and Community Characteristics

Among the key institutional factors shown to enable local sustainability efforts is capacity, a consistent predictor for both sustainability policy adoption and implementation across studies (Krause, Hawkins and Park 2021). An organization's capacity is not monolithic; a number of internal and external factors are at play, from tangible (e.g., fiscal, human, and technical resources) to intangible assets (e.g., stakeholder support) (Horton et al. 2003; Wang et al. 2012). Organizational capacity is defined by the combination of these various factors and their interactions. Given this study's interest in understanding the predictors of localities' increased financial and human resource commitment, the bulk of internal institutional capacity, it is necessary to assess relationships with external forces, including intergovernmental transfers and community (financial) capacity.

Intergovernmental grants are an indispensable component of resource management for many local governments. Especially in the face of today's economic uncertainty, they provide an important stabilizing force for localities and help them meet ever-increasing public demands for quality

government services. To this end, some scholars describe federalism as "the most enduring model of collaborative problem resolution" (Agranoff and McGuire 2004). Such funding transfers not only provide a direct pump into local governments' resource base but may also facilitate policy innovations. The theory of laboratory federalism holds that fiscal decentralization is conducive to policy innovations that would be riskier in a larger national setting (Oates 1999)—many environmental policy problems (i.e., ecological restoration, biodiversity preservation, and air quality) require experimental and innovative approaches. Therefore, we could expect positive outcomes from intergovernmental transfers to localities that help address those policy problems.

Nonetheless, fiscal federalism has also been described as a restraint on subnational governments in implementing policy initiatives. These subsidies come with spending requirements, limiting localities' autonomy in managing the resources efficiently and possibly canceling out the expected positive effects. This may be particularly the case in South Korea, where the federalist tradition does not exist. Intergovernmental grants come with strings attached under the central-regional-local hierarchical financial structure (Kim 2013). This limited local policy autonomy may have been even more problematic recently with intergovernmental transfers from regional (upper-tier) government to local (lower-tier) governments, called *City/Do Bojogum* (Kim and Chung 2018; Lee 2019). Although the heads of local (lower-tier) governments in South Korea have legal rights to spend the intergovernmental transfer revenue, the accounting/auditing of the grant is still seated at the regional (upper-tier) level. Local governments in South Korea cannot exercise discretion on local tax rates or relief to expand local tax revenue, which in turn imposes various spending requirements from the regional government (Lee 2019). Based on the aforementioned discussion, we hypothesize that:

> Hypothesis 1: The degree to which local governments depend on intergovernmental transfers is negatively associated with their level of resource commitment to environmental sustainability.

Community characteristics have also received significant attention. Albeit inconclusive, research suggests that certain features of local communities are more relevant than others for understanding their sustainability efforts and capacity to advance them. For example, Homsy and Warner (2015) found that localities with affluent, educated, and 'creative' classes are likely to adopt sustainability programs on their own: these classes will demand sustainability services to preserve property values and quality of life. Population size has also been found to predict greater sustainability efforts among localities. While large population size may indicate increased problem complexity and

heterogeneity, it is also the driving force of economic, social, and cultural benefits, including expanded diversity and tax base—sustainability research often considers it as a proxy for community capacity in mobilizing necessary resources to coordinate sustainability efforts (Betsill 2001; Krause 2011).

Hypothesis 2: The more affluent localities are, the more likely they are to invest resources in environmental sustainability.
Hypothesis 3: The more populated localities are, the more likely they are to invest resources in environmental sustainability.

Conservatism: Political Ideology and Issue Salience

A locality's socio-political attitude towards environmental sustainability is also an important consideration in understanding their commitment to furthering green efforts. The political ideology of the local community and factors that shape opinions on environmental concerns can exercise significant influence on local decision-making. Policy decisions like environmental protection often face pushback for their lack of immediate and tangible returns. Furthermore, the political rhetoric of pro-development groups juxtaposes environmental conservation with forgone opportunities for economic growth.

Overall, evidence suggests a negative association between political conservatism and environmentally friendly policies and programs (Allen, Castano and Allen 2007; Peifer, Khalsa and Ecklund 2016). While conservatives are not all of one view, conservative politicians, by and large, tend to be less supportive of environmental protection measures than their counterparts at the opposite end of the political spectrum (Panno et al. 2018; Thompson 2005). Another critical factor that shapes local socio-political climate is issue salience. The more severe an environmental problem is facing a local community, the more likely they perceive it as a legitimate policy problem requiring attention and resources to solve (Homsy and Warner 2015; Svara and Watt 2013).

Politically conservative parties in South Korea have generally tended to be less responsive to environmental sustainability issues (Kim 2013; Kim 2017). For example, when South Korea's draft roadmaps for carbon neutrality by 2050 were announced, politically conservative politicians and interest groups, such as the Federation of Korean Industries, criticized the proposed scenarios as unrealistic or even threatening to South Korea's energy-intensive industries. Conservatives in South Korea, especially at the local government level, have generally been averse to finding their own environmental policy solution; recently, however, some conservative mayors have argued that environmental protection, water and air quality, and land conservation can improve local economies. In more recent years, conservatives have proposed solutions that emphasize the importance of business enterprise, corporate leadership, and market-driven innovations, such as technological

innovations on energy sources, emissions reduction, and pollution clean-up. Most notably, in 2008, the conservative President Lee Myung-bak backed "Green Growth" initiatives that included an investment of $85 billion in clean energy.

As the concern for the environment emerged as one of the most salient political issues during the last few decades in the country, even the conservatives in South Korea had to formulate substantive environmental sustainability policies. For example, air pollution has become an important political issue as the concentration of fine dust particles surged to record levels in many parts of the country. More than 90 percent of South Koreans surveyed in 2018 responded that air pollution was causing them physical or psychological pain (Chae 2018). At the regional level, Seoul has introduced environmental measures for air quality emergencies, such as curbing vehicle use and limiting dependence on coal-fired power stations. Based on these discussions, we hypothesize that:

Hypothesis 4: Politically conservative local government heads and councils negatively affect local governments' level of resource commitment to environmental sustainability.

Hypothesis 5: The more severe the environmental problems face localities, the more likely they are to commit resources to environmental sustainability.

Contractual Dynamics: Outsourcing and Alternative Service Delivery Arrangements

Local government practice has involved a mix of public provision and contracting/outsourcing (Ferris 1986; Van Genugten, Van Thiel and Voorn 2020); these alternative service delivery arrangements are largely unexplored empirically in sustainability literature. Local governments are increasingly under fiscal pressure and thus find it necessary to diversify service provision and delivery arrangements (Allen et al. 2020; Furlong and Bakker 2010). Service production and delivery once managed in-house, including environmental functions, are now often farmed out to private or nonprofit contractors (Bogason 1996; Brown and Potoski 2005). Even in the governments where the in-house direct provision remains the dominant paradigm, contracting or commissioning takes a very strong second place (Hefetz and Warner 2004, 2012; Nemetz 2015; Warner and Hebdon 2001). As a result, local residents commonly receive sustainability-related services from various vendors, including private companies, nonprofit organizations, and other jurisdictions' public agencies (Krause et al. 2019; Stokan and Deslatte 2019).

The contracting and commissioning of local governments' environmental services have received both support and criticism (Hirsch 1995). Researchers within the Public Choice tradition generally favor competitive contracting, arguing that contracting can help mitigate the problems of bureaucratic inefficiencies, avoid expensive labor requirements, and benefit from economies of scale (Vining 2011; Vining and Weimer 1992). Other scholars have argued that contracting improves the organizational flexibility of government by enabling managers to focus on the core activities of their agencies (O'Leary and Bingham 2003; O'Leary and Vij 2012). On the other hand, some argue that the efficiency and cost-saving claims of government contracting approaches are not well supported empirically. Some research even found deleterious effects of contracting on civic engagement and broad public interest (Davies 2010; DeLeon and Denhardt 2000). Milward (1996) argued that contracting approaches create a "hollow state" in which government agencies cannot provide accountable public services by themselves.

The impact of contracting out decisions on resource commitment has not been well-documented. Contracting and outsourcing of services generally come with more market-like performance control mechanisms, such as competitive tender and performance audit, to overcome information asymmetry issues (Van Genugten, Van Thiel and Voorn 2020). The principal-agent model has been suggested to theorize the relationship between local governments and service contractors (Voorn and van Genugten 2021): the local government (the principal) hires a private/non-profit service provider (the agent) to carry out a particular task, such as environmental sustainability services. As principal, localities may face uncertainties as to whether the contractors are performing as agreed; certain monitoring devices and performance management systems are put in place to compensate for this information disadvantage. For this reason, transaction cost economics suggests that the cost of monitoring the performance of the contractor should discount the merit of outsourcing.

Outsourcing-based performance practices set goals for supplier performance, basing decisions on quantifiable indicators and results-based compensation. Performance management systems set up to prevent an agent's opportunistic or self-interested behaviors may end up focusing too much on short-term performance goals that can be used for immediate contractual purposes, such as the competitive tender process. In turn, this short-term goal orientation may create disincentives for local decision-makers to invest resources in public programs that require long-term persistent efforts, such as environmental sustainability. Performance information produced under a short-term goal management system can be used by local government managers with managerial autonomy to reduce commitment to long-term

sustainability goals and, rather, make or buy services that can achieve substantive outcomes immediately.

Hypothesis 6: The more local governments outsource their environmental management programs, the less likely they are to commit resources to environment sustainability.

Data and Method

Data

Our analysis used administrative data collected from multiple independent archival sources in South Korea, including Local Government Finance Statistics, the Ministry for Environment, the National Election Commission, and the Ministry of Public Administration and Safety. Local Government Finance Statistics offer a wide array of financial information on local and regional governments, local state-run enterprises, and local education boards such as local tax, revenue, spending, and financial planning. The Ministry for Environment archives provide information on environment-related management issues, such as the volume of waste generation and greenhouse gas emission. The Ministry of Public Administration and Safety data includes information on local governments' internal management, such as staffing. The National Election Commission provides data on local and regional elections and local/regional councils.

The unit of analysis was a local government, of which 226 instances (in 15 regions) were included in the final dataset—data from multiple sources collected in 2017 were merged at the local government level. We employed a linear regression model for estimation. Since the dataset covers 226 (second-tier) local governments in 15 (first-tier) regions, the variables within each regional government jurisdiction may not be independent, which could lead to residuals that are not independent within regions. In the presence of clustered errors, standard errors could lead to an incorrect inference in a large proportion of finite samples (although regression estimates could still be unbiased). Therefore, we used the clustered standard errors to account for possible clustering—and thus the correlation—of observations at a regional level. We also report heteroskedasticity-adjusted results suggested by Davidson and MacKinnon (1993, 554–556), which produce confidence intervals that tend to be more conservative than other robustness models (Angrist and Pischke 2008, 294–308). Compared to the approach that ignores non-constant error variance, the heteroskedastic-consistent standard errors, as well as the confidence intervals derived from them, perform better at preserving the Type I error rate (Long and Ervin 2000).

Variables

The dependent variable (DV) was the local government's resource commitment to environmental sustainability services. In line with previous research, this study examines resource commitment through two dimensions—financial and human resources. Extant research has largely relied on a binary measure to capture whether or not dedicated resources are in place for implementing sustainability goals and plans. In other words, localities are lumped together into a dichotomy of those that have resources and those that do not. While this approach still offers a good overview of resource dedication, it underestimates the fact that a huge variation exists even among those with dedicated resources. Thus, this research employs continuous measures to capture the varying degree to which different localities are invested in their sustainability efforts.

Local and regional governments in South Korea have the discretion to allocate financial and staffing resources to certain projects or programs (such as sustainability initiatives), although they have limited autonomy to increase or decrease the total volume of budget or staff. Given the potential cost variations across different sustainability programs and services, we examined an additional dependent variable for enhanced accuracy and validity of our operationalization of local governments' fiscal resource commitment. This secondary fiscal resource commitment variable was measured by the percentage of the total annual budget dedicated to sustainability services. The total amount of environmental sustainability budget in local governments often include also some of the public works expenditures such as garbage collection and sewage treatment; we included measures that are more directly involved in environmental sustainability efforts that are local governments' budget on biodiversity, budget on air quality, and budget on ecological restoration.

Independent variables (IVs) of interest included localities' resource dependency on higher governments and community characteristics, which together capture external capacity, and political ideology, issue salience, and alternative service delivery arrangements. *Resource dependency* was measured by the percentage of local government revenue (out of total budget) transferred from the national/central or regional government authorities. *Community capacity* was captured by two variables: population size (a logged number of residents in a local government's jurisdiction) and per capita real gross domestic product (GDP) (a million KRW, South Korean Won). To capture *political ideology*, we included three variables: conservative elected official, conservative local council, and the local official from ruling party. Conservative elected official is a dummy variable, scored one if the (elected) head of the government is a member of the conservative party. The conservative local council was measured by the percentage of

local councilors from the conservative party. We also measured whether an elected official was from the ruling party to control for any unobserved political power dynamics—this is a binary variable indicating whether the elected head of the local government is a member of the ruling party in the National Assembly. We measured *issue salience* by using two variables: per capita waste generation, measured by the amount (kg) of waste generated by an individual local resident per day (a year average), and greenhouse gas emission by energy consumption (Gg co2eq.). We operationalized local government environmental management *outsourcing* by estimating the percentage of annual budget spent to pay contracted vendors who deliver

Table 1. Descriptive Statistics.

Variable	Mean	Std. Dev.	Min.	Max.
DV1: % of budget dedicated for sustainability	6.408	2.531	2.181	20.441
DV2: sustainability staff size (headcount)	42.19	23.176	9	139
DV3: sustainability budget size (a million KRW)	33,735	21,549	3,817	118,064
DV4: budget on biodiversity (a million KRW)	1,690	5,209	0	67,976
DV5: budget on air quality (a million KRW)	1,500	3,084	0	18,602
DV6: budget on ecological restoration (a million KRW)	1,896	3,822	0	26,178
IV (*outsourcing*): environmental management outsourcing %	17.068	21.271	0	99.852
IV (*resource dependency*) resource dependency to higher governments %	55.73	12.873	9.929	76.211
IV (*political ideology*): elected official (head of local government) from ruling party	0.353	0.479	0	1
IV (*political ideology*): conservative local council (%)	50.473	29.183	0	100
IV (*political ideology*): conservative elected official (head of local government)	0.517	0.5	0	1
IV (*community capacity*): per capita GDP (a million KRW)	33.851	31.542	7.156	388.464
IV (*community capacity*): population size (logged)	5.13	0.452	4	6.077
IV (*issue salience*): per capita waste generation (kg per day)	1.103	0.406	0.42	3.55
IV (*issue salience*): greenhouse gas emission by energy consumption (Gg co2eq.)	226	48,553	36,166	5,027
IV (*control*): per capita local tax revenue (a million KRW)	0.512	0.274	0.117	1.412

environmental services (of the total environmental sustainability budget). Lastly, we control for local tax revenue since it could confound our analysis of the relationship between our key independent variables and local human and financial resource commitment to sustainability.

Table 1 presents descriptive statistics of the variables specified in our model, showing that some of our variables of interest differ across local governments. For example, while one local government has zero outsourcing of environmental service provision, another outsources over 99 percent of these services. Dependent variables also varied significantly, from a local government with only nine dedicated staff members to one with 139 staffs. Per capita waste generation ranged from 0.42 kg of waste per day in one jurisdiction to 3.55 kg of waste per day in another—this 8-fold difference in a waste generation may be due to the differences in industrial bases of the localities as this measure not just measure the household waste generation but also industrial waste generation divided by the number of residents. This suggests that local governments face very different levels of environmental service demands. In terms of possible multicollinearity issues, we considered Variance Inflation Factor (VIF) and found the highest VIF in our models indicate 3.03, which doesn't reach even conservative threshold values in the field.

Result and Discussion

Figure 1 presents a histogram for a volume of sustainability budget (percent) and local government sustainability staffing headcount. The figure shows that these dependent variables follow roughly bell-shaped curves, bunched around the center of the data, though slightly right-skewed with longer right tails. On average, South Korea's local governments spend 33,735 million KRW a year (about US$28 million) on environmental sustainability initiatives, 6.4 percent of their total annual budget (an average of 42 staff).

Table 2 shows the regression results for the percentage of the budget dedicated to a local government's sustainability initiatives and for the headcount of staff dedicated to sustainability. The results suggest that environmental management outsourcing is significantly and negatively associated both with the sustainability budget percentage and with the headcount of sustainability staff. Per capita waste generation is positively related to sustainability budget percentage but is statistically significant only in the ordinary least squares (OLS) estimation. Per capita GDP is positively and significantly associated with sustainability staff headcount, but only in the model in which standard error is adjusted (robust). Local tax revenue is positively associated with sustainability budget percentage. Population size is negatively associated with sustainability budget percentage but positively related to sustainability

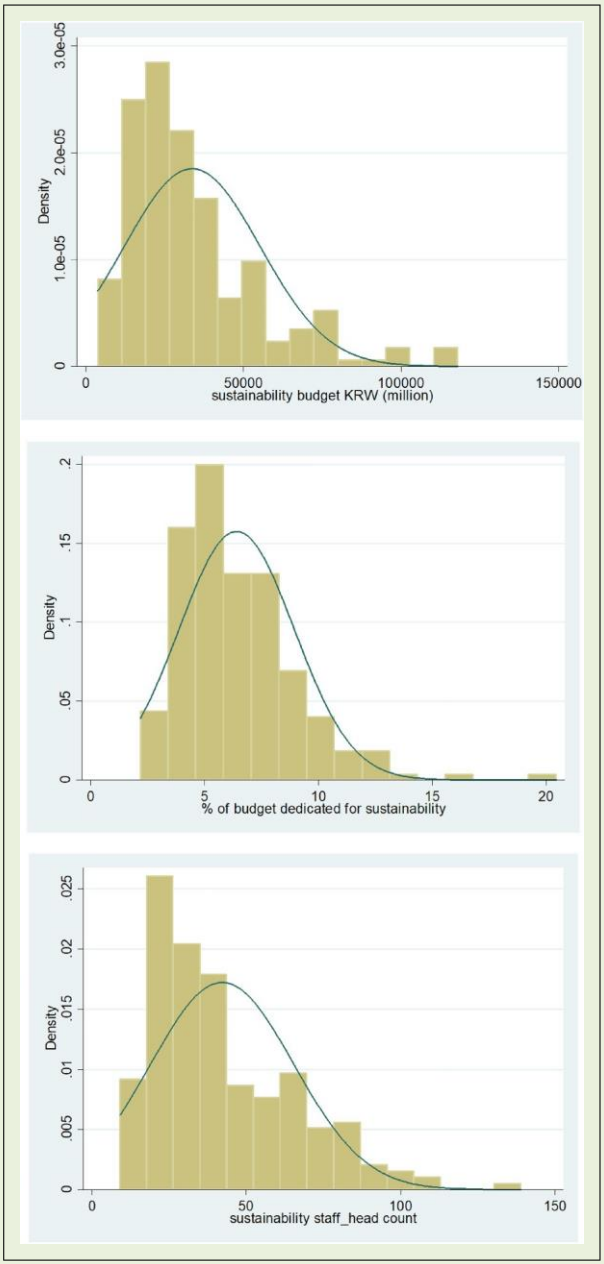

Figure 1. Histogram for dependent variables: staffing and financial commitment to sustainability.

Table 2. Regression Results for Sustainability Budget Proportion and Headcount of Staff Dedicated to Sustainability.

	DV1: sustainability budget %					DV2: staff dedicated to sustainability				
Variables	Coeff.	Beta	OLS	cluster	robust	Coeff.	Beta	OLS	cluster	robust
Environment management outsourcing	−0.016	−0.142	(0.007) **	(0.004) ***	(0.006) ***	−0.100	−0.092	(0.055) *	(0.052) *	(0.049) **
Resource dependency on higher governments	0.011	0.057	(0.018)	(0.012)	(0.016)	0.119	0.066	(0.143)	(0.137)	(0.154)
Elected official from the ruling party	−0.029	−0.005	(0.521)	(0.958)	(0.719)	2.588	0.054	(3.973)	(4.502)	(3.347)
Conservative local council	−0.010	−0.121	(0.006)	(0.007)	(0.007)	0.0126	0.016	(0.049)	(0.054)	(0.045)
Conservative elected official	0.295	0.058	(0.513)	(0.753)	(0.569)	−1.300	−0.028	(3.914)	(2.966)	(2.957)
Per capita waste generation	0.857	0.138	(0.482) *	(0.723)	(0.600)	0.677	0.012	(3.676)	(4.113)	(3.049)
Per capita GDP	−0.005	−0.066	(0.006)	(0.006)	(0.005)	0.0776	0.106	(0.048)	(0.056)	(0.035) **
Local tax revenue	1.799	0.195	(0.835) **	(0.961) *	(0.850) **	−2.227	−0.026	(6.370)	(8.756)	(5.786)
Population (logged)	−1.502	−0.269	(0.457) ***	(0.600) **	(0.495) ***	36.60	0.715	(3.487) ***	(6.455) ***	(3.442) ***
Greenhouse gas emission	1.3e-5	0.199	(4.6e-6) ***	(4.4e-6) ***	(4.5e-6) ***	3.4e-7	0.001	(3.5e-5)	(3.4e-5)	(3.0e-5)
Constant	11.82		(3.391) ***	(3.243) ***	(3.546) ***	-154.0		(25.870) ***	(35.570) ***	(25.960) ***
Observations			226	226	226			226	226	226
R-squared			0.269	0.269	0.269			0.493	0.493	0.493

Note: *** p < 0.01, ** p < 0.05, * p < 0.1 standard errors in parentheses.

Table 3. Regression Results for Sustainability Budget Size and Budget on Biodiversity.

Variables	DV3: sustainability budget size					DV4: budget on biodiversity				
	Coeff.	Beta	OLS	cluster	robust	Coeff.	Beta	OLS	cluster	robust
Environment management outsourcing	−133.1	−0.131	(54.49) **	(42.07) ***	(56.48) **	−29.17	−0.119	(16.74) *	(14.08) *	(15.07) *
Resource dependency to higher governments	−26.87	−0.016	(140.2)	(92.22)	(161.8)	35.74	0.088	(43.06)	(35.62)	(33.14)
Elected official from ruling party	−5,042	−0.112	(3,904)	(6,725)	(4,752)	−153.8	−0.014	(1,199)	(490.1)	(673.8)
Conservative local council	−125.9	−0.171	(48.88) **	(80.44)	(48.84) **	−35.29	−0.198	(15.01) **	(28.93)	(28.99)
Conservative elected official	−2,299	−0.053	(3,846)	(5,205)	(4,066)	1,019	0.098	(1,181)	(1,348)	(1,422)
Per capita waste generation	7,934	0.150	(3,612) **	(3,476) **	(3,590) **	591.7	0.046	(1,109)	(802.4)	(818.5)
Per capita GDP	−160.9	−0.235	(47.25) ***	(44.90) ***	(61.33) ***	−14.07	−0.085	(14.51)	(10.14)	(10.61)
Local tax revenue	35,864	0.457	(6,259) ***	(6,586) ***	(6,939) ***	5,483	0.289	(1,922) ***	(5,075)	(4,708)
Population (logged)	22,320	0.469	(3,426) ***	(4,939) ***	(3,753) ***	1,553	0.135	(1,052)	(1,180)	(1,042)
Greenhouse gas emission	0.120	0.202	(0.034) ***	(0.042) **	(0.030) ***	3.9e-4	0.003	(0.0107)	(0.0146)	(0.0141)
Constant	-95,393	.	(25,420) ***	(21,715) ***	(26,427) ***	-9,481	.	(7,807)	(8,140)	(7,186)
Observations			226	226	226			226	226	226
R-squared			0.433	0.433	0.433			0.085	0.085	0.085

Note: *** p < 0.01, ** p < 0.05, * p < 0.1 standard errors in parentheses.

staff headcount. Greenhouse gas emission is positively and significantly associated with sustainability budget percentage.

Table 3 shows the regression results for sustainability budget size and a budget on biodiversity. Environmental management outsourcing and conservative local council are negatively and significantly related to sustainability budget size and with the budget on biodiversity. Per capita waste generation is positively associated with sustainability budget size. Local tax revenue is positively associated with sustainability budget size and to budget on biodiversity (but only in OLS estimation). Population size and greenhouse gas emission are both positively associated with sustainability budget size.

Table 4 presents the regression results for a budget on air quality and ecological restoration. Resource dependency on higher governments is negatively related to the budget on air quality; it is also associated negatively with the budget on ecological restoration, but only in the model in which standard error is adjusted (cluster). Conservative local council is negatively associated with the budget on ecological restoration. Conservative elected official is negatively related to the budget on air quality. Per capita GDP is negatively associated with the budget on air quality (but not significant in robust estimation) and is also related negatively to the budget on ecological restoration. Local tax revenue is positively associated with both budget on air quality and the budget on ecological. Population size is positively related to the budget on air quality. Standardized beta coefficient values in our models show that strong predictors of resource commitment are population size, local tax revenue, per capita GDP, and resource dependency on higher government.

Taken together, our analysis partially confirms our research hypotheses on localities' resource commitment, although variations were found across types. Regarding hypothesis 1 (dependency on intergovernmental transfers reduces resource commitment), we found that resource dependency on upper-level (regional) government is negatively associated with the budget on air quality and ecological restoration, although this association was not consistently found in the other models with different measures. One possible explanation for such inconsistent results may be the South Korean governments' structural differences from a federal system and the expectations and norms embedded within the structure, as discussed above.

Our testing of hypothesis 2 (affluent localities invest more resources in sustainability) and hypothesis 3 (populated localities invest more resources in sustainability) show some mixed results across environmental programs. Overall, the population is found to have a positive effect on localities' resource investment, but this observation requires a caveat; it is positively

Table 4. Regression Results for the Budget on air Quality and Ecological Restoration.

	DV5: budget on air quality					DV6: budget on ecological restoration				
Variables	Coeff.	Beta	OLS	cluster	robust	Coeff.	Beta	OLS	cluster	robust
Environment management outsourcing	5.311	0.037	(7.725)	(9.852)	(8.958)	−2.037	−0.011	(12.14)	(6.930)	(8.493)
Resource dependency to higher governments	−103.9	−0.434	(19.88) ***	(42.24) **	(34.56) ***	−26.45	−0.089	(31.25)	(14.42) *	(30.27)
Elected official from ruling party	−521.5	−0.081	(553.5)	(522.7)	(541.5)	−527.4	−0.066	(870.1)	(593.1)	(770.8)
Conservative local council	−6.548	−0.062	(6.930)	(5.796)	(5.969)	−24.74	−0.189	(10.89) **	(13.35) *	(13.44) *
Conservative elected official	−993.0	−0.161	(545.3) *	(576.3)	(551.9) *	789.6	0.103	(857.2)	(601.3)	(632.9)
Per capita waste generation	333.1	0.044	(512.0)	(516.0)	(480.0)	772.6	0.082	(804.9)	(1,409)	(1,085)
Per capita GDP	−27.11	−0.277	(6.698) ***	(6.156) ***	(19.95)	−23.56	−0.194	(10.53) **	(12.59) *	(12.52) *
Local tax revenue	2,214	0.197	(887.4) **	(918.8) **	(1,204) *	2,863	0.206	(1,395) **	(1,073) **	(1,162) **
Population (logged)	1,716	0.252	(485.7) ***	(836.6) *	(499.8) ***	911.2	0.108	(763.6)	(904.4)	(836.1)
Greenhouse gas emission	0.001	0.023	(0.004)	(0.006)	(0.003)	0.007	0.072	(0.007)	(0.008)	(0.007)
Constant	−1,271		(3,604)	(3,323)	(4,280)	−2,140		(5,665)	(5,107)	(5,745)
Observations			226	226	226			226	226	226
R-squared			0.444	0.444	0.444			0.105	0.105	0.105

Note: *** p < 0.01, ** p < 0.05, * p < 0.1 standard errors in parentheses.

associated with sustainability budget size, sustainability staffing, and air quality. Interestingly, however, population rather shows a negative estimate when the proportion of sustainability budget is considered. This is likely so due to a sizable total budget that highly populous cities operate on. From these, we could infer that the bigger cities tend to have a bigger sustainability budget and staffing and expend more resources for improving air quality, yet when considered in the entirety of budget, the spending is not or even inversely proportional to the size of their population. Per capita GDP is also negatively related to the budget on air quality and ecological restoration. Therefore, the findings regarding hypothesis 2 and hypothesis 3 are mixed and, in some models, run counter to our theoretical expectations. This may also be due to other variables controlled in our models. For example, local tax revenue is known to be closely related to set local government priorities, which, in turn, are positively associated with resource commitment to sustainability in the models of this study and have an obvious association with per capita GDP.

Testing hypothesis 4 (conservatives commit fewer resources to sustainability) revealed that conservative local councils are associated with lower levels of sustainability budget size and budget on ecological restoration, and conservative elected heads of local governments spend less budget on air quality. As to hypothesis 5 (the severity of environmental problems in localities increases their resource commitment to sustainability), our findings show that per capita waste generation and greenhouse gas emission are both positively related to sustainability budget proportion and size. Our test results of hypothesis 6 (outsourcing reduces resource commitment to sustainability) show that environmental management outsourced by local governments is associated negatively with sustainability budget percentage and size, the headcount of sustainability staff, and budget on biodiversity.

Our results imply that *community capacity* predicts local governments' financial resource commitment to environmental sustainability: sustainability projects often involve larger resource requirements with a delayed and/or uncertain return on investment, requiring stable and consistent local tax revenue (Krause 2011). The negative association between environmental management *outsourcing* and local government resource commitment to sustainability (typically long-term efforts) may reflect the impact of a shift from direct in-house provision to contracting approaches, which focus on short-term, visible returns on investment. Findings around the conservative orientation of elected officials and local council imply that the *political ideology* influences sustainability commitment choice, as different policy orientations can shape the different levels of commitment depending on constituent support.

Conclusion

Taking local government as a unit of analysis, we explored the drivers of commitment of financial resources and human capacity to environmental sustainability, using multiple independent sources of administrative and archival data from 226 local government entities in 15 regions. Our findings indicate that resource dependency, community capacity, political ideology, issue salience, and outsourcing have statistically significant relationships with local government resource commitment to environmental sustainability. As local governments make crucial decisions on many sustainability-related matters, they should require a clearer understanding of how community capacity, conservatism, and contracting relate to resource prioritization for environmental sustainability goals. Our findings may imply that local governments with the more in-house provision of environmental services may invest more in sustainability: an outsourced structure may leverage more short-term performance gains that can be used for yearly contract renewal or competitive vendor, creating an unfavorable response to long-term environmental commitment.

This research contributes to the body of literature by testing under-studied antecedents of resource commitment by local governments on sustainability initiatives. This study used better measures for fiscal commitments of resources, which enhances the extant urban sustainability research that is mostly survey-based. Localities' purse strings reflect their preferences. Studies that capture actual resource commitments to sustainability projects or programs are a critical stage of understanding the incentives among local government leaders which exist today and the incentives we need to advance substantive gains.

We expect future studies to complement the limitations of our analysis. Firstly, while our measure captures actual financial commitment by local governments, it still has room for improvement—budget items included in our analyses come from lines dedicated to sustainability and environmental protection policies and programs exclusively, and thus we are only able to consider resources directly expended on such programs. Other policies and programs may be indirectly associated with sustainability initiatives, making our measure an incomplete picture of overall sustainability efforts. Secondly, we rely on objectively measured variables from administrative data and lack perceptual and soft measures that can illustrate mechanisms of inter-governmental dynamics. The next steps should include integrating perceptual and administrative research designs. Lastly, as indicated above, because we utilized a cross-sectional dataset, our findings are limited in identifying causal factors that would enable localities' resource commitment to sustainability—understanding these causal links is vital to convincing our local governments to make appropriate resource investments in building

sustainable communities. To that end, data that would allow for the observance of longitudinal trends should inform future studies.

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