

# **Challenges of Commons Forest Management in the Era of Urbanization: An Opinion Survey of Communities in Nagahama City, Shiga Prefecture, Japan**

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(Abstract)

Commons forest management faces many difficulties in this era of urbanization, in which people have fewer interactions with nature and society becomes more individualistic.

In 2011, we conducted a survey of people's practices and opinions regarding commons forest management in 248 communities within a city in central Japan. We found that 92 communities own their forests through neighborhood council ownerships, temple/shrine ownerships, group ownerships, etc. Of the 47 communities that reported ownership sizes, 83% owned less than 50 ha. A majority of the responding communities hope to improve the quality of the forests by tending them, and to pass on this tradition to future generations. A majority are less inclined to use the forests for recreation purposes or to let outside volunteer groups manage the forests. The three most desired functions of forests are the purification of air and mitigation of noise, creation of a water resource reservoir, and landslide and flood control. The three least desired points are symbolization of neighborhood council, timber production, and mushroom/mountain vegetable cultivation. Factor analyses and other multivariate analyses were conducted to extract significant underlying factors influencing the attitudes of the communities and to find potential interactions among the identified factors.

These patterns in the visions and desired functions of forests embody the conundrum of commons forest management in contemporary Japan. The visions for forests represent traditional, agricultural values, focused on monetary benefits. The desired functions have more to do with the necessities of an infrastructure system rather than serving as a source of material resources. The discrepancies found here indicate the need for new commons forest management measures, which may include more active involvement of local governments for managing forests as part of an urban infrastructure.

Key Words:

*commons forests, Japan, urbanization, neighborhood council, vision, function*

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## 1. INTRODUCTION

Commons forest management faces many difficulties in this era of urbanization, in which people have fewer interactions with nature and society becomes more individualistic. In Japan, commons forest management had been conducted through agricultural production and lifestyle. Litter in forests was collected by farmers and turned into a compost fertilizer for croplands, and harvested wood was used for housing and tools or for fuel. Self-reliant agricultural life made it necessary for farmers to utilize forest resources close to their villages to the fullest extent possible. For the survival of villagers in the long run, restraints imposed by a community on the use of forests were also required. Villagers had to pay close attention to how forests were managed in the agricultural society. Agriculture heavily relying on rice production requires the coordination of irrigation, which leads to tight control of individual farmers' behavior, including the use of forest resources.

Japan has been in an industrialization period since the late 19<sup>th</sup> century. The preconditions for commons forest management in the agricultural society have disappeared one by one. Previously, most people were farmers; now the majority work in manufacturing or service industries. Agriculture has been separated from forests, in that fertilizers from forests are no longer needed because farmers rely instead on chemical fertilizers. Energy comes from fossil fuels imported from the Middle East. In addition, the financial value of forests has decreased because timber prices have been relatively low. The suppression of the financial value of forests reduces societal focus on these areas. In the early to mid-20<sup>th</sup> century, proceeds from timber sales from commons forests helped communities build elementary schools or community halls, but these arrangements have ceased. In the absence of such contributions of commons forest, people have begun to lose interest in managing commons forests.

This paper discusses how people perceive and envision the management of commons forests under such conditions drawing on the results of a questionnaire survey conducted in Nagahama City in Shiga Prefecture, Japan, in 2011. The aim of this paper is to evaluate the current status of management of commons forests in the study area and to identify potential directions for better organization of commons forest management.

The paper is organized as follows: Section 2 introduces the study area. Section 3 explains the research method. Section 4 presents the results of the questionnaire survey. Section 5 analyzes the results, and Section 6 discusses them. Finally, Section 7 closes the paper with conclusions.

## 2. STUDY AREA

Nagahama City is located in Shiga Prefecture, which is in the central part of Honshu Island, Japan. The City has an area of 680.79 km<sup>2</sup>, within which 164.40 km<sup>2</sup> (24%) represent livable areas (Shiga Prefecture, 2010). Forest constitutes 373.01 km<sup>2</sup>, or 55% of the whole. Thirty-four percent of the forests are plantation forests, mainly of Japanese cedar trees.

The ownership structure of forests in Nagahama City is one dominated by private ownership, as is commonly found in western Japan (Figure 1). Forty-one percent of forest areas are privately owned. Of forest areas, a total of 24%—village-owned areas (13%) and production forestry cooperative (11%)—can be called “commons forests” since they are managed by communities that are descendants of old agricultural villages. Contrary to the data listed in the ownership registry, shrine- and temple-owned forests as well as a portion of privately owned forests are in fact commons forests since they are managed by communities.

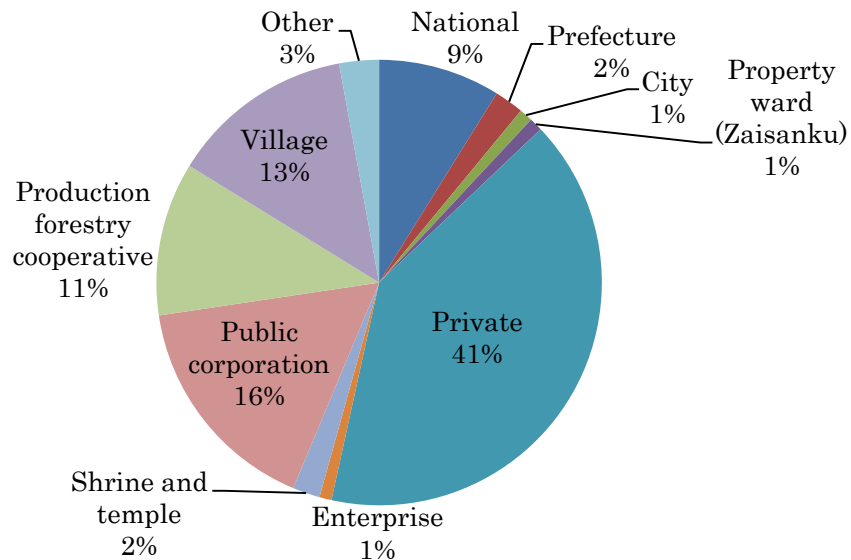


Figure 1: Forest Ownership Structure in Nagahama City (Shiga Prefecture, 2010)

From the economic perspective, Nagahama City represents a fully industrialized structure. The city has 22,743 households, of which 1% constitute agricultural/fishery households, 1% mixed (agricultural/fishery and nonagricultural) households, and 75% nonagricultural households (Figure 2). These figures indicate that a majority of households earn their revenues mainly from nonagricultural, nonforestry activities.

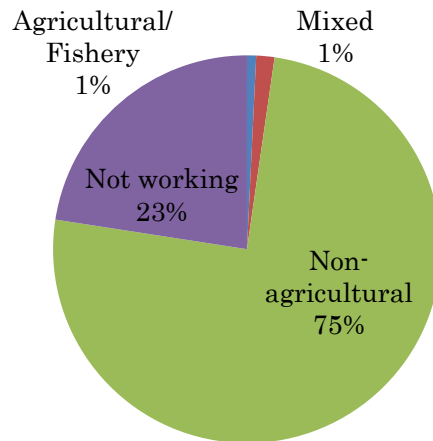


Figure 2: Economic Characteristics of Households in Nagahama City (Shiga Prefecture, 2010)

Even though the physical landscapes observed in Nagahama City may appear rural, the economic landscape of this area exhibits urbanized characteristics.

### 3. RESEARCH METHOD

To obtain information about current views on commons forest management from the perspective of local residents, we conducted a questionnaire survey. We sent our survey instruments to neighborhood councils in Nagahama City, which are the nexus of community activities in this area.

The questionnaire instrument included questions regarding (1) basic information of respondents, (2) types of commons forest ownership, (3) forest areas and plantation ratios, (4) forest management, (5) private ownership in the area, (6) positions for forest management within the association, (7) future vision for commons forests, and (8) free opinions. In the next section, only the results relevant to this manuscript are explained; other data are not. In all, the questionnaire was sent to 443 people in August 2011; 248 responses were returned by mail from September 1 through September 20 (response rate: 56%).

### 4. RESULTS

Figure 3 provides the positions held by questionnaire respondents, 93% of whom were presidents of neighborhood councils.

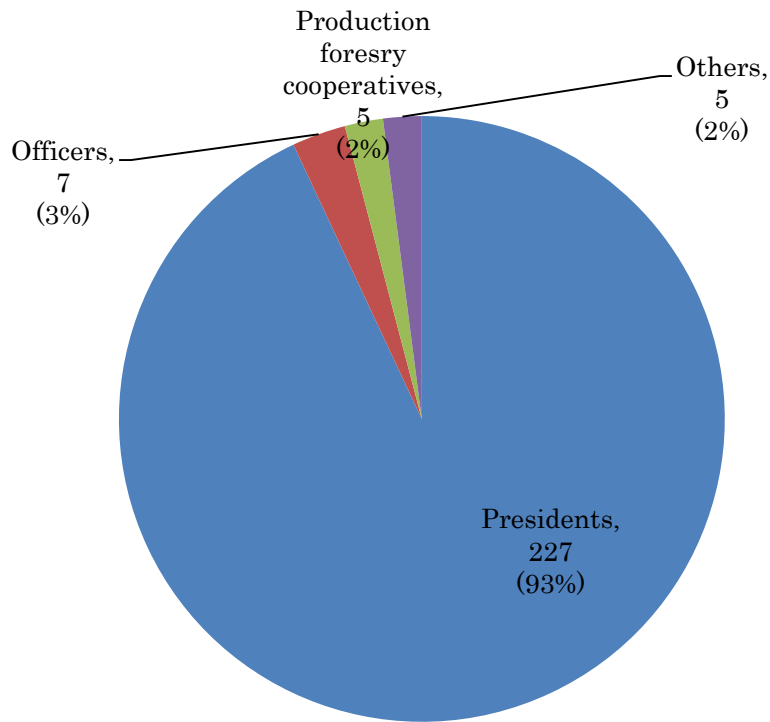


Figure 3: Positions of Respondents ( $n=244$ )

Out of 268 councils that responded, 92 (34%) own forests through several types of ownership. (The total number of responses, 268, exceeds the number of respondents, 248, because multiple answers are permitted.) The main ownership types include ownership by councils (38% of councils owning forests) and ownership by shrines or temples located in the area (35%).

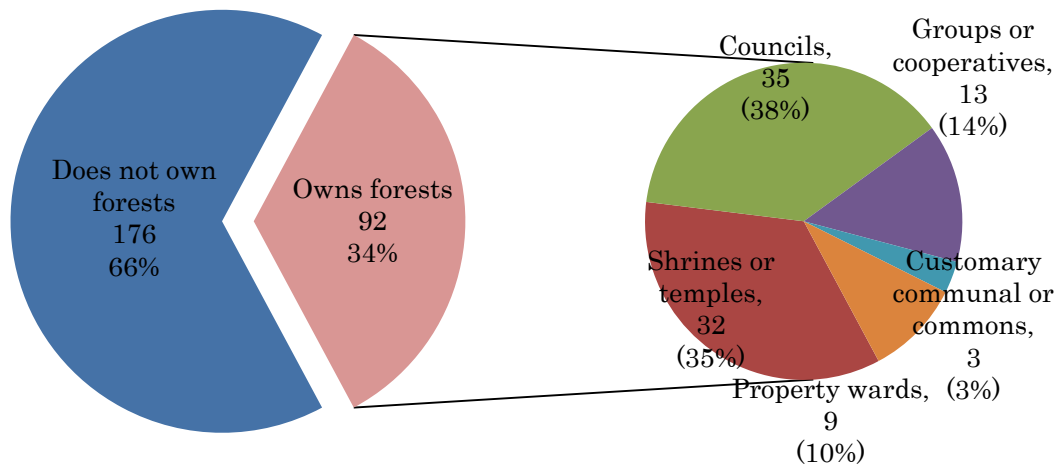


Figure 4: Types of Ownership ( $n=268$ , Multiple Answers)

Forty-seven respondents reported the area of commons forest ownership (Figure 5). Note that most commons forests (83%) are smaller than 50 ha.

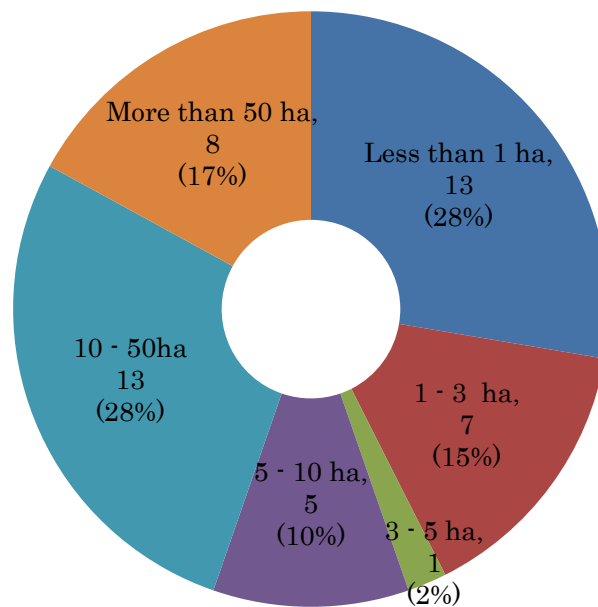


Figure 5: Area Sizes of Ownership ( $n=47$ )

We also asked how well the forests are managed by requesting information about the percentages of borders identified (Table 1). The largest group, councils, was not aware of such information (14 councils, 29.8%). The next largest group,

councils, identified about 90% of their forest borders, but only 24 of the 47 associations had identification rates of 50% or above. This indicates the sample represents a wide range of management levels in terms of border identification.

Table 1: Percentages of Borders Identified by Councils

<b>Borders Identified</b>	<b>Cases</b>	<b>%</b>
<b>0%</b>	1	2.1%
<b>10%</b>	4	8.5%
<b>20%</b>	2	4.3%
<b>30%</b>	1	2.1%
<b>40%</b>	1	2.1%
<b>50%</b>	2	4.3%
<b>60%</b>	2	4.3%
<b>70%</b>	2	4.3%
<b>80%</b>	5	10.6%
<b>90%</b>	12	25.5%
<b>100%</b>	1	2.1%
<b>Don't know</b>	14	29.8%
<b>TOTAL</b>	47	100.0%

We asked about future vision for commons forests, specifically opinions on alternative directions regarding management of forests. Figure 6 represents the answers given to the alternatives in terms of opinions among council members, opinions that are supposed by the respondents. Alternatives are ordered according to popularity, that is, the larger the percentage of the responses “Several have such opinions,” “Majority agree,” and “All agree” for an alternative, the higher the alternative appears in the chart. Overall, respondents preferred forests be left for the future generations in a better state (alternatives G and A). On the other hand, opening the forest to outsiders was not a popular option (alternatives C and F). Siting recreation activities in the commons forest was also not preferred (alternative C).

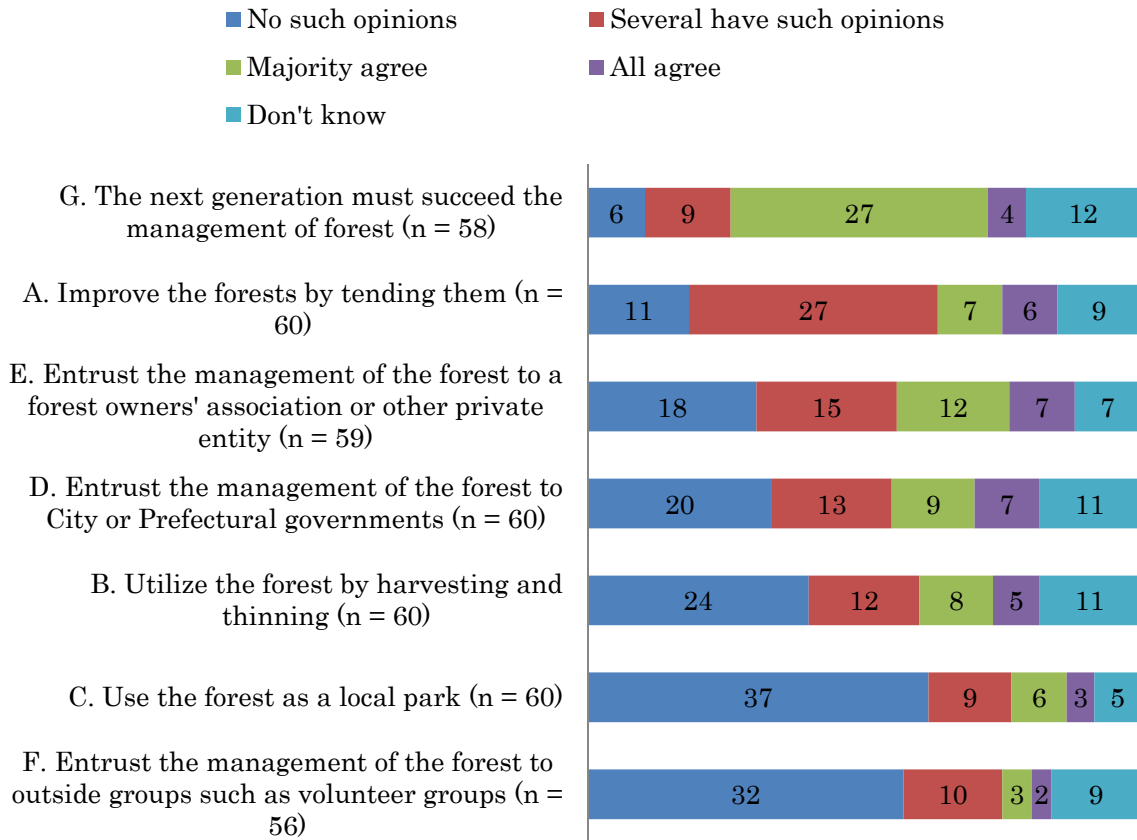


Figure 6: Visions of Forest Management

We also asked how strongly respondents desired the respective functions of commons forests (Figure 7). The respective functions are ordered according to intensity of desire, specifically the percentages of three responses: “A little desired,” “Somewhat desired,” and “Strongly desired.” The function “purifying air and mitigating noises” attracted the strongest desire from the largest number of respondents, 83.3%  $((24 + 20 + 6) / 60 = 0.833)$ . The next two most strongly desired functions were “storing water” and “preventing disasters such as landslides or floods.” The three least desired functions were “producing mushrooms and mountain vegetables,” “producing timber,” and as a “symbol for unifying the community.”



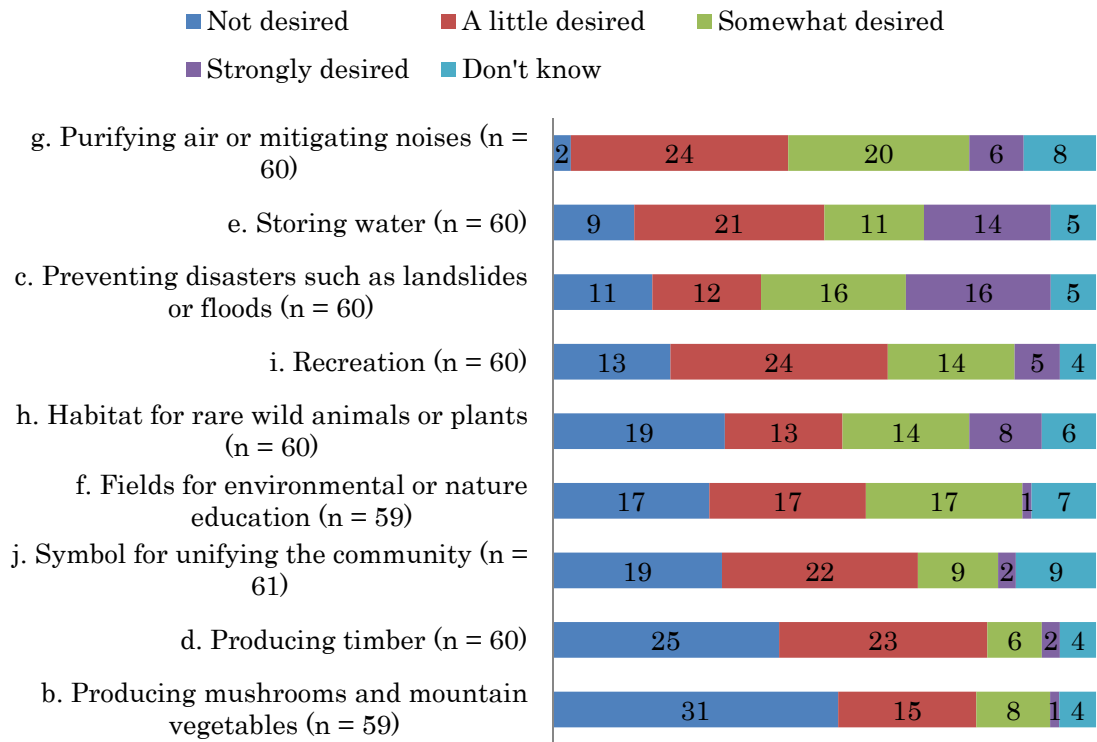


Figure 7: Desired Functions of the Forests

## 5. ANALYSIS

Factor analyses were conducted so that we could identify underlying factors determining the future vision for commons forests and expectations of the forests. Tables 2 and 3 present the results of the factor analyses regarding visions and desired functions, respectively.

Table 2: Factor Analysis of Visions of Commons Forests (Factor Loadings)

Factor Names	Entrust	Park	Improvement
	Factor 1	Factor 2	Factor 3
Entrust to forest owners' association etc. (E)	0.773	0.272	0.055
Entrust to local governments (D)	0.708	0.418	-0.256
Producing timber (B)	0.640	0.092	0.305
Local park (C)	0.150	0.878	0.448
Outside volunteers (F)	0.438	0.693	-0.073
Improvement (A)	0.639	0.169	0.664
Succession to the next generation (G)	-0.002	0.023	0.237

Table 3: Factor Analysis of Desired Functions from Commons Forests (Factor Loadings)

Factor Names	Material	Psychological	Environmental
	Factor 1	Factor 2	Factor 3
Water storage	0.728	0.032	0.481
Disaster prevention	0.720	0.027	0.451
Climate change	0.700	0.184	0.396
Mushroom/mountain vegetables	0.634	0.369	0.133
Timber production	0.613	0.254	0.017
Recreation	0.054	0.835	0.412
Education	0.377	0.832	0.021
Symbol	0.120	0.753	0.084
Habitats	0.251	0.177	0.691
Air/water purification	0.406	0.513	0.563

Three factors were identified in variables for the visions for commons forests (Table 2), namely, “Entrust,” “Park,” and “Improvement.” Shaded cells, which have factor loadings of more than 0.5, show factors that are strongly correlated to certain visions. The “Entrust” factor represents an inclination toward entrustment to certain organizations (other than outside organizations) as well as timber production or improvement of forest stands for purposes such as future production. The “Park” factor represents an inclination toward use of commons forests as local parks and permissiveness for outsider intervention. Lastly, the “Improvement” factor represents a willingness to improve commons forest without considering utilizing them now.

Three factors were also identified in desired functions of commons forests (Table 3), namely, “Material,” “Psychological,” and “Environmental.” Shaded cells, which have factor loadings over 0.5, show factors that are strongly correlated to certain functions. The “Material” has high loadings with “Water storage,” “Disaster prevention,” “Climate change,” “Mushroom/mountain vegetables,” and “Timber production” functions, all of which represent material benefits accruing to humans. The “Psychological” factor has high loadings with “Recreation,” “Education,” “Symbol,” and “Air/water purification” functions. Except for the “Air/water purification” function, these variables involve psychological or mental satisfaction derived from forests. The “Environmental” factor has high loadings with the “Habitats (of wild animals and plants)” and “Air/water purification” functions, all of which represent altruistic and ecosystem-oriented benefits.

The correlations among the factor scores representing the above-mentioned six factors were examined (Table 4). The “Entrust” vision correlates with “Material” and “Environmental” functions. The “Park” vision correlates with the “Psychological”

function. The “Improvement” vision correlates with the “Psychological” function.

Table 4: Correlation Coefficients among the Factor Scores Representing Visions and Desired Functions of Commons Forests

Vision or Function	Vision			Function		
	Entrust	Park	Improvement	Material	Psychological	Environmental
Vision						
Entrust	1	-0.167	0.037	0.309*	0.043	0.365**
Park	-0.167	1	-0.032	-0.281	0.437**	-0.086
Improvement	0.037	-0.032	1	0.093	0.322*	0.147
Function						
Material	0.309*	-0.281	0.093	1	0.175	0.103
Psychological	0.043	0.437**	0.322*	0.175	1	0.329*
Environmental	0.365**	-0.086	0.147	0.103	0.329*	1

\*Statistical significance at 10% level.

\*\*Statistical significance at 5% level.

## 6. DISCUSSION

The patterns in the visions and desired functions of forests embody the conundrum of commons forest management in contemporary Japan. Visions for forests represent traditional agricultural values that focus on monetary benefits. The top two visions, “G. The next generation must succeed the management of forests” and “A. Improve the forests by tending to them” may be interpreted as a manifestation of the respondents’ (or their interpretation of council members’) desire to leave the forests as assets to the future generations in a better condition. On the other hand, the desired functions have more to do with the necessities of an infrastructure system than with serving as a source of material resources. The top three desired functions are “g. Purifying air or mitigating noises,” “e. Storing water” and “c. Prevention of disasters such as landslides or floods.”

The discrepancies found here indicate the need for new commons forest management measures, which may include more active involvement of local governments in managing forests as part of urban infrastructure.

Through factor analyses and correlation analysis, we determined the overall structure of visions and desired functions of commons forests in the study area. Three “vision” factors—“Entrust,” “Park,” and “Improvement”—were identified. Three “function” factors were also identified: “Material,” “Psychological,” and “Environmental.” The “Entrust” vision factors’ correlation with “Material” and “Environmental” functions indicates councils hope to entrust the forests to the entities they can rely upon to ensure physical benefits from the forests. “Park” and

“Improvement” visions’ correlation with the “Psychological” function shows that councils hope to protect the forests to ensure psychological, ecological, or spiritual benefits of forests.

We have thus far referred to the forests related to or managed by neighborhood councils as “commons forests” as if they were a homogeneous group. Our research findings, however, appear to indicate that there are different types of commons forests based upon the visions that neighborhood councils hold for them. Different types of management structures or organizational forms may be needed for these different types of commons forests. At the minimum, government officials and researchers should be aware of the existence of such differences.

## 7. CONCLUSION

We conducted an opinion survey of neighborhood councils asking their opinions regarding forests, particularly commons forests, in 2011. We found discrepancies between future visions rooted in traditional agricultural social norms and desired functions related to societal infrastructure. These discrepancies suggest that we need to consider significant involvement of local governments in the management of commons forests more seriously. We also found differences among commons forests with regard to the vision that neighborhood councils hold. The need to think about commons forests as diverse entities rather than a homogeneous whole was noted.

This study has some limitations. The study area was limited to Nagahama City, which has unique characteristics owing to its socioeconomic attributes as well as historical events. A generalization for larger geographical areas should be done with caution. In addition, the survey instrument was standardized and thus may have failed to extract unanticipated opinions, but the free descriptions and option for “other” in this survey instrument must have invited such opinions.

## REFERENCES

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