

Measuring Toyota Citizens' Eco-Awareness: Is the City's Eco-Policy More Recognized?

Ayako Yamashita, Chihiro Watarai, Daiki Ieshima, Erina Suzuki, Kanchi Miyagi, Kazuki Mizushima, Kazuki Shibata, Kazuki Shimizu, Kazuki Sugiura, Keina Katsuhara, Keisuke Kamiya, Kouki Nakano, Naoya Fukagawa, Rie Sasaki, Ryou Matsushima, Saki Hasegawa, Shinji Oono, Shinya Oota, Syuuhei Kouta, Takahiro Oguri, Takanobu Aono, Takumi Hino, Tsuyoshi Fujita, Yoshimasa Aihara, Yousuke Soga, Yuusuke Nishida, Yuuta Asauchi, Yuuta Nakagawa, and Hiroshi Ito*

Nagoya University of Commerce and Business (NUCB), 4-4 Sagamine, Komenoki-cho, Nisshin-shi, Aichi 470-0193 Japan

Abstract

In 2009, Toyota City was selected as an environmental model city by the Japanese government. The city has been working on addressing environmental issues and raising citizens' awareness of its eco-policy while focusing on five relevant themes: transportation, forests, the urban center, industry, and public welfare and livelihood. In 2012, surveys were conducted in Toyota City to examine how much citizens recognized the eco-policy. The study showed that fewer than 40% of Toyota City citizens were aware of the fact that the city was designated as an environmental model city. Using the same research method as the 2012 study, a similar survey was conducted in 2014 to examine how the citizens' awareness of the eco-policy had shifted. The findings show little sign of improvement in citizens' eco-awareness. The recognition rate of most topics had dropped in the 2014 findings compared to those of 2012. This paper explores possible reasons for the results and makes suggestions for improving eco-awareness.

Keywords: *eco-policy; urban planning; sustainable development; environmental assessment*

1. Introduction

Toyota City is a city in Aichi, Japan and is best known for being the location of the headquarters of the Toyota Motor Corporation. In 2009, Toyota City was designated as one of the environmental model cities by Japan's Ministry of Environment (Toyota City, 2009). Environmental model cities are those that have intended to reduce *carbon emissions*, a commonly used term for greenhouse

gas emissions, including carbon dioxide (CO), in pursuit of a low carbon society (Cabinet of Japan, 2014). Compared to the carbon emission level of 1990, Toyota City aims to reduce carbon emissions by 30% by 2030 and 50% by 2050. In order to promote its eco-policy, Toyota City has been making efforts to raise the eco-awareness of citizens, as they play a key role in transforming

* Corresponding author: hito@nucba.ac.jp

eco-policy into practice (Masuura, 2010; Sennes et al., 2012; United Nations University, 2012). In 2012, Toyota City built the Ecoful Town, a pavilion that demonstrates how the city addresses environmental issues through thematic strategies based on *kotsu* (transportation), *shinrin* (forest), *toshin* (urban center), *sangyo* (industry), and *minsei* (public welfare and livelihood). According to personnel from Toyota City Hall, all fourth graders at the primary level go to Ecoful Town before summer break for a social studies tour. Toyota Nishi High School, which has been selected by Japan's Ministry of Education, Culture, Sports, Science, and Technology (MEXT), is one of the largest schools (with about 1,000 students) and a Super Science School that focuses on training future scientists. The school sends students to Ecoful Town to learn how technologies address environmental issues. Likewise, Toyota Higashi High School, also a large school with 700 students and a UNESCO Associated School that promotes Education for Sustainable Development (ESD), sends students to Ecoful Town for a similar purpose (T. Shimizu, personal communication, July 28th, 2014). Ecoful Town attracts adults as well. Personnel from Toyota City Hall informed us that *Hogaraka*, a natural food restaurant using ingredients from the city and located inside Ecoful Town, has been very popular among customers, especially women in their twenties (T. Shimizu, personal communication, July 28, 2014). As of July 2014, Ecoful Town had received over 100,000 visitors (Toyota City, 2014a).

In addition to Ecoful Town, the Eco Family Card has been widely used as a form of electronic currency for shopping in eco-affiliate stores and has served as a method of promoting eco-policy. In the 2012 research study, approximately two-thirds of the respondents knew of and/or had Eco Family Cards (Ito, 2014b). According to personnel from Toyota City Hall, free papers with information on the city's eco-policy are distributed during civic events and mailed to 70% of the citizens (A. Nakagaki, personal communication, December 8th, 2013). The city has also created a Facebook account and provides a concept book for children to explain its eco-policy (A. Nakagaki, personal communication, December 8th, 2013). Inside the city, Ha:mo, an urban transport support system with NAVI (an information system that supports low-carbon, seamless mobility) and RIDE (a car

sharing system that uses compact electric vehicles for urban short-distance transportation), has become more visible. However, it remains uncertain how successful the city's eco-policy has been in terms of raising citizens' awareness.

2. Toyota City's Eco-Policy

According to Sennes et al. (2012), citizens play a key role in environmental preservation due to their "direct contribution to ecological impacts and influence on local socio-economic actors" (186). Citizens' "commitment to their local environment may be highly dependent on local town planning and urban development policies" (194). Thus, it is important that citizens are aware of their city's eco-policies. Toyota City has been promoting its eco-policy by focusing on five relevant themes: transportation, forests, the urban center, industry, and public welfare and livelihood (Toyota City, 2014b). Detailed information about these themes is provided in the 2012 research report (Ito, 2014a). Nonetheless, the following sections briefly review relevant and updated issues, focusing on items included in the survey questionnaires.

Transportation

Next-generation vehicles such as electric vehicles (EVs) and plug-in hybrid vehicles (PHVs) have been a driving force in materializing eco-transportation policy. Comus is an example of an EV. Its battery is rechargeable from a home outlet, and the vehicle does not emit CO₂. i-Road, a three-wheeled EV, has recently been introduced by the Toyota Motor Corporation. Unlike Comus with its one seat, i-Road can accommodate two passengers (de Paula, 2014). Despite the development of EVs, the infrastructural establishment of a network of electric battery charging stations has been an issue. In this regard, Toyota City already has 2.88 stations per 10,000 citizens, which is the highest installation rate per capita in Japan (Aichi Prefecture, 2014). However, most of the stations only have normal battery chargers that take several hours to recharge an EV, and only three of them are express chargers that take half an hour to do so. Increasing the number of express battery chargers will be essential for EVs to gain more popularity. PHVs run with electricity and switch to gas only when necessary. Toyota Motor Corporation has intended to increase the annual sales of HVs,

including PHVs, to over one million. The company sold 1.21 million HVs in 2012 and 1.27 million in 2013 (Toyota Motor Corporation, 2014).

Forests

According to Toyota City (2013c), forests account for about 70% of the city's landmass. Millions of dollars have been spent on *kanbatsu* (periodic thinning) to maximize CO₂ absorption and to sustain a quality timber supply (Lowell et al., 2012). However, a sustainable supply of lumber is difficult to maintain due to the high delivery costs involved (Nikkei Ecology, 2001). The use of thinned trees has also been explored. In 2011, a project called the Asahi Tree Station was started. While thinned trees have often been abandoned without being utilized due to delivery costs, the project has established a place called "*Ki no eki* (Tree Station)" where thinned trees are piled to be collected by dealers for sale. One ton of these thinned trees value at 6,000 yen (approximately 60 USD) in regional currency called *Mori ken* (forest coupon), and currently 350 tons of thinned trees are processed (Shinrin, 2014).

The Urban Center

As Kleerekoper (2012) states, temperatures in urban areas tend to be higher than those in rural areas due to the heat-island phenomenon, which may cause increased air pollution and the deterioration of soil quality. Creating urban green spaces is important to mitigate the heat-island phenomenon (Karuppannan et al., 2014) because plants absorb CO₂ and heat and stabilize temperatures. Toyota City has greened their urban center 10% and aims to reach 20% through rooftop wall greening, environmentally friendly parking, and water-retentive pavement.

Industry

Toyota City promotes and financially supports the development of sustainable plants; factories with systems for creating, storing, and economizing energy; and environmental performance through the use of renewable energy (e.g., biomass, solar, and wind energy) (Toyota Motor Corporation, 2013). Nonetheless, many small and medium sized companies are unable to develop sustainable plants, as their resources are limited even with the support from Toyota City.

Public Welfare and Livelihood

The Smart House plays a key role in Toyota City's public welfare and livelihood eco-policy. With a home energy management system (HEMS) that utilizes information technologies to control and monitor energy usage, the Smart House effectively controls and monitors energy production and consumption (e.g., electricity, gas, and water) at home (Gross, 1998). Robles and Kim (2010, p. 37) define the Smart House as "the integration of technology and services through home networking for a better quality of living." They generate energy through solar panels and can store the energy in a home storage battery or in EVs. An EV battery can store up to a few days of electric energy for home usage (Automotive Technology, 2011). Homeowners can also sell extra energy to City Hall or electric power companies.

In order to popularize its eco-policy among citizens, Toyota City has promoted the Eco Family Card with "eco-points" that can be exchanged for certain products. When registered citizens purchase an ecological product with the Eco Family Card at a greenly affiliated store, recycle something at a designated place, or visit Ecoful Town, they can receive points. Once a certain number of points have accumulated they can be exchanged for certain goods, such as stationery, bus tickets, or gift certificates. Toyota City has been working on increasing the number of greenly affiliated stores to further popularize the use of eco-points for continued promotion of its eco-policy.

3. Methodology

In November 2012, a study about Toyota citizens' awareness of the city's eco-policy was conducted with 229 individuals, 167 of whom resided in Toyota City. The study was published in the *Journal of Sustainable Development* (Ito, 2014a) and showed that fewer than 40% of Toyota citizens were aware of the city's eco-policy. The 2012 research recommended that a longitudinal trend study be conducted in the future in order to examine the shift in the citizens' awareness since no benchmark figures existed at the time of the original study. It is in this context that the 2014 trend study was conducted. As Cohen et al. (2011) explain, "Trend studies focus on factors rather than people, and these factors are studied over time."

New samples are drawn at each stage of the data collection, but focusing on the same factors” (p. 267).

Survey questionnaires were distributed on the street, in a shopping mall, and in a public building with a library and other facilities near the Toyota City Station. These locations were selected and arranged in consultation with personnel from Toyota City Hall. Among the 315 individuals surveyed, 247 resided in Toyota City. Since the study was designed to serve as a benchmark test of the previous study, the survey questions were constructed based on those of the 2012 research.

The questions were classified into the following three categories: personal, general, and specific. The questionnaires first requested personal information (i.e., age, sex, and home city to screen non-Toyota citizens) then asked participants about Toyota City’s eco-policy, such as whether they knew that Toyota City was selected as an environmental model city, whether they knew about Ecoful Town, and whether they had been to Ecoful Town. The questionnaires then asked questions related to more specific themes (i.e., transportation, forests, the urban center, industry, and public welfare and livelihood).

Concerning transportation, participants were asked whether they were considering purchasing next generation cars such as EVs or PHVs and whether they knew about the placement of the battery charging stations that are essential for the use and proliferation of EVs. With respect to forests, participants were asked whether they knew about *kanbatsu* (periodic thinning) and its effectiveness for reducing carbon emissions. Regarding public welfare and livelihood, participants were asked whether they knew about the Smart House, HEMS, and the Eco Family Card. Regarding industry, participants were asked whether they knew that small and medium size companies make efforts to create and develop sustainable plants.

4. Results

In general, citizens’ awareness of Toyota City’s eco-policy seems to have declined. The percentage of participants who reported that they knew that Toyota City was selected as an environmental model city decreased by 5.4% from 39.6% to 34.2% between 2012 and 2014.

On the other hand, the percentage of the participants who reported recognition of Ecoful Town almost doubled from 31.4% in 2012 to 60.5% in 2014. Likewise, the percentage of those who have been there increased from a mere 2.1% to 10.4% (though there remains plenty of room for improvement).

Table 1

Personal Information: Age and Sex

	2012	2014
Age		
<19	57 (34.6%)	121 (49.0%)
20-29	23 (13.9%)	26(10.5%)
30-39	23 (13.9%)	24 (9.7%)
40-49	17 (10.3%)	23 (9.3%)
>50	45 (27.3%)	53 (21.5%)
Unspecified	2	0
Sex		
Male	75 (55.6%)	128 (51.8%)
Female	60 (44.4%)	119 (48.2%)
Unspecified	32	0
Total Respondents	167	247

Table 2

General information about public awareness of Toyota City’s eco-policy

	2012	2014
Do you know Toyota was selected as an environmental model city?		
Yes	64 (39.0%)	83 (34.2%)
No	100 (61.0%)	160 (65.8%)
Unanswered	3	4
Do you know about Ecoful Town?		
Yes	48 (31.4%)	147 (60.5%)
No	105 (68.6%)	96 (39.5%)
Unanswered	14	4
Have you been to Ecoful Town?		
Yes	2 (2.1%)	21 (8.6%)
No	97 (97.9%)	222 (91.4%)
Unanswered	9	4

On the issue of transportation, the percentage of participants thinking of purchasing next generation vehicles such as EVs or PHVs remained more or less the same with 40.4% in 2012 and 40.0% in 2014.

Table 3

Specific information about public awareness of Toyota City's eco-policy

	2012	2014
Transportation		
Are you considering buying a next generation vehicle?		
Yes	65 (40.4%)	98 (40.0%)
No	96 (59.6%)	147 (60.0%)
Unanswered	6	2
Do you know battery charging stations are allocated every 10 km ² ?		
Yes	39 (23.5%)	32 (13.1%)
No	127 (76.5%)	212 (86.9%)
Unanswered	1	3
Forests		
Do you know <i>kanbatsu</i> and its effectiveness for CO ₂ reduction?		
Yes	81 (50.0%)	85 (34.8%)
No	81 (50.0%)	159 (65.2%)
Unanswered	5	3
Urban center		
Do you know about the heat-island phenomenon?		
Yes	71 (42.5%)	93 (38.1%)
No	96 (57.5%)	151 (61.9%)
Unanswered	0	3
Industry		
Do you know that small / medium size companies are working on establishing sustainable plants?		
Yes	67 (41.1%)	48 (19.7%)
No	96 (58.9%)	196 (80.3%)
Unanswered	4	3
Public welfare and livelihood		
Do you know about the Smart House?		
Yes	87 (52.1%)	133 (54.5%)
No	80 (47.9%)	111 (45.5%)
Unanswered	0	3
Do you know about the HEMS?		
Yes	22 (13.2%)	20 (8.2%)
No	145 (86.8%)	224 (91.8%)
Unanswered	0	3
Do you know about the Eco Family Card?		
Yes	113 (67.7%)	140 (57.6%)
No	54 (32.3%)	103 (42.4%)
Unanswered	0	4

With respect to battery-charging stations, only 13.1% in the 2014 research knew that battery-charging stations were placed every 10 km² in the urban center, down from 23.5% in 2012.

Concerning forests, those who knew about *kanbatsu* (periodic thinning) decreased from 50% in 2012 to 34.8% in 2014. Regarding the urban center, the percentage of the participants who knew about the heat-island phenomenon also decreased from 42.5% in 2012 to 38.1% in 2014. With reference to industry, only 19.7% in 2014, compared to 41.1% in 2012, reported that they knew about sustainable plants in Toyota City.

Regarding public welfare and livelihood, 54.5% of the participants knew about the Smart House, an increase from 52.1% in 2012. Only 8.2% in 2014, as opposed to 13.2% in 2012, reported that they knew of HEMS. The citizens' recognition of the Eco Family Card had also decreased from 67.7% in 2012 to 57.6% in 2014. In summary, apart from Ecoful Town and the Smart House, citizens' recognition rates of eco-related items dropped between 2012 and 2014.

Among these items, shifts in the recognition rate of Ecoful Town, battery charging stations, *kanbatsu*, sustainable plants, and the Eco Family Card were statistically significant ($p < 0.01$). That is, it is plausible to conclude that the citizens' recognition of Ecoful Town improved while those of battery charging stations, *kanbatsu*, sustainable plants, and the Eco Family Card deteriorated.

One of the possible limitations of this research is that almost half of the respondents were under the age of 20 (U-20) and may not represent the general populations' recognition of the city's eco-policy. Indeed, the 2012 research indicates that the age seems to have affected the results (Ito, 2014a). As age increased, respondents were more likely to know about Toyota City's eco-policy. For example, in the 2012 research, while only 15.8% of the U-20 participants knew that Toyota City was designated as an environmental model city, 43.5% of the participants aged 20-39 and 56.5% of the participants aged 40 and above knew. Therefore, it may be important to solely examine the sample populations aged 20 or above (age 20+) in 2012 and 2014.

Table 4

Personal Information: Age and Sex (age 20+)

	2012	2014
Age		
20-29	22 (20.4%)	26 (20.6%)
30-39	23 (21.3%)	24 (19.0%)
40-49	17 (15.7%)	23 (18.3%)
>50	46 (42.6%)	53 (42.1%)
Unspecified	0	2
Sex		
Male	54 (58.7%)	66 (51.6%)
Female	38 (41.3%)	62 (48.4%)
Unspecified	16	0
Total Respondents	108	128

Table 5

General information about public awareness of Toyota City's eco-policy (age 20+)

	2012	2014
Do you know Toyota was selected as an environmental model city?		
Yes	52 (48.6%)	58 (45.3%)
No	55 (51.4%)	67 (53.6%)
Unanswered	1	3
Do you know about Ecoful Town?		
Yes	52 (48.6%)	96 (76.8%)
No	55 (51.4%)	29 (23.2%)
Unanswered	1	3
Have you been to Ecoful Town?		
Yes	2 (2.0%)	13 (10.4%)
No	97 (98.0%)	112 (89.6%)
Unanswered	9	3

When sample populations of respondents age 20+ were compared, the 2014 respondents outperformed the 2012 respondents in the recognition of Ecoful Town, the heat-island phenomenon, sustainable plants, and the Eco Family Card. Among these items, the differences in the recognition of Ecoful Town and sustainable plants were statistically significant ($P < 0.01$). The recognition rate of the 2014 respondents remained the same as that of the 2012 respondents regarding *kanbatsu* and almost the same with regard to the battery charging stations.

Table 6

Specific information about public awareness of Toyota City's eco-policy (age 20 +)

	2012	2014
Transportation		
Are you considering buying a next generation vehicle?		
Yes	56 (53.3%)	64 (50.8%)
No	49 (46.7%)	62 (49.2%)
Unanswered	3	2
Do you know the battery charging stations are allocated every 10 km ² ?		
Yes	25 (23.4%)	29 (23.0%)
No	82 (76.6%)	97 (77.0%)
Unanswered	1	2
Forests		
Do you know <i>kanbatsu</i> and its effectiveness for CO2 reduction?		
Yes	47 (44.8%)	56 (44.8%)
No	58 (55.2%)	69 (55.2%)
Unanswered	3	3
Urban Center		
Do you know about the heat island phenomenon/greening?		
Yes	55 (50.9%)	67 (53.6%)
No	53 (49.1%)	58 (46.4%)
Unanswered		3
Industry		
Do you know that small / medium size companies are working on sustainable plants?		
Yes	50 (47.2%)	86 (68.8%)
No	56 (52.8%)	39 (31.2%)
Unanswered	2	3
Public Welfare and Livelihood		
Do you know about the Smart House?		
Yes	61 (56.5%)	68 (54.4%)
No	47 (43.5%)	57 (45.6%)
Unanswered	0	3
Do you know about the HEMS?		
Yes	19 (17.6%)	12 (9.6%)
No	89 (82.4%)	112 (90.4%)
Unanswered	0	4
Do you know about the Eco Family Card?		
Yes	61 (56.5%)	82 (66.1%)
No	47 (43.5%)	42 (33.9%)
Unanswered	0	4

It is interesting to note that while the percentage of the 2014 respondents in general (including U-20) who knew about the Ecoful Town was higher than that of the 2012 respondents, the percentage of those age 20+ who knew about the Smart House was lower than that of the 2012 respondents. That is, in the 2014 research, the respondents U-20 helped increase the recognition rate of the Smart House while lowering all the other items, including Ecoful Town.

5. Discussion

This study indicates that only the recognition rates of Ecoful Town and the Smart House improved between 2012 and 2014. Given that Ecoful Town and the Smart House have been showcased in the city center (10 minute walk from the train station), their central presence promotes their visibility and recognition. The other items' recognition rates declined. One of the possible explanations for the deterioration of the citizens' recognition is the passage of time. For example, the Eco Family Card, a potential catalyst for promoting Toyota City's eco-policy (Ito, 2014a), has gained popularity in part because it was initiated and promoted during the 2005 World Exposition that attracted over 22 million visitors (Japan Association for the Promotion of Creative Events, 2005). Also, Toyota City was designated as an environmental model city by the Japanese government in 2009, and the media attention was considerable at that time because the Democratic Party of Japan, which took office from the Liberal Democratic Party of Japan in the same year, emphasized the green economy (Democratic Party of Japan, 2009). While the age 20+ population likely remembers these events, the younger generation may not. Indeed, U-20 participants outperformed the age 20+ population only in the recognition of the Smart House. As a result, citizens' awareness of Toyota City's eco-policy deteriorated on most items.

Given that U-20 participants are less aware of eco-policy than those in other age categories, it may be reasonable to target them to promote eco-policy. Ecoful Town may be a suitable place for students at any level to visit as a social study tour to learn

about environmental issues, including eco-policy. Also, school age children can be assigned homework to do research on eco-items, such as the Smart House and HEMS, by going to Ecoful Town with parents or family members. This way, adults and children alike can learn about the city's eco-policy. University students can also visit Ecoful Town as part of their coursework. Some universities in Aichi send their students to Ecoful Town to learn about how Toyota City intends to materialize its eco-policy (Ito, 2014b).

Also, as suggested in the 2012 study, participatory action-oriented research is "a powerful tool for change and improvement at the local level" (Cohen, Manion, and Morrison, 2011, p. 344). Educating local respondents through research should take place. During this study, while looking at survey questions, some respondents seemed to become interested in Toyota City's eco-policy. For example, one male respondent said, "I did not know there is such a thing [Toyota City's eco-policy]. I would like to learn more about this." Some respondents asked questions about some eco-items, such as the Smart House and HEMS, and we were able to provide some information. At the same time, we also learned about the city's history, the current situation, and the future prospects through interactions with local respondents. This kind of survey study should continue to take place periodically, as it may serve as a promotional tool about the city's eco-policy and can provide information that helps the city make strategic decisions on how to further promote and increase awareness of the eco-policy.

Acknowledgements

I would like to thank Mr. Tomoya Shimizu at Toyota City Hall for his support of this study as well as Prof. Nobuo Kawazoe at the Nagoya University of Commerce and Business for helping me with statistical analysis of the collected data. I also would like to thank Mr. Ezra Anton Greene for editing this paper.

Reference

- Aichi Prefecture. (2014), "The Placement of the Battery Charging Stations." Accessed July 14, 2014. http://www.pref.aichi.jp/cmsfiles/contents/0000063/63344/vision_aichi_2.pdf
- Automotive Technology. (2011), "A New Value Created by the Car Battery: The Key is How to Use Information about Electric Power." *Automotive Technology* November 2011
- Cabinet of Japan. (2014), "Overview of environmental model cities." http://www.kantei.go.jp/singi/tiiki/kankyo/pdf/model_gaiyo.pdf
- Cohen, L., Manion, L., and Morrison, K. (2011), *Research Methods in Education*. Routledge.
- de Paula, M. (2014), "Toyota i-road Test Drive: Is This Three-Wheeled Electric Vehicle the Answer to Urban Gridlock?" Accessed June 5, 2014. <http://www.popsci.com/blog-network/speed-lab/toyota-i-road-test-drive-three-wheeled-electric-vehicle-answer-urban-gridlock>
- Democratic Party of Japan. (2009), "Manifesto 2009." Accessed July 5, 2014 www.dpj.or.jp/download/325
- Gross, M. D. (1998), "Smart House and Home Automation Technologies." In *Encyclopedia of Housing* by W. van Vliet (ed). New York: Sage Publication.
- Ito, H. (2014a), "Toyota as an environmental model city: Is its eco-policy recognized?" *Journal of Sustainable Development* 7(2): 70-78
- Ito, H. (2014b), "Shaping the First-Year Experience: Assessment of the Vision Planning Seminar at the Nagoya University of Commerce and Business." *International Journal of Higher Education* 3(3): 1-9
- Japan Association for the Promotion of Creative Events. (2005), "What the 2005 world exposition left us." Accessed June 1, 2014. <http://www.jace.or.jp/archives/0601/000064.html>
- Karuppannan, S., Baharuddin, Z. M., Sivam, A. and Daniels, C. (2013), "The Sustainable Design and Renewal of Water's Edge Public Spaces in the Asia-Pacific Region: Sydney, Hong Kong and Singapore." *Journal of Sustainable Development* 7(1): 1-16
- Klepprekooper, L., van Esch, M. and Salcedo, T. B. (2012), "How to Make a City Climate-Proof, Addressing the Urban Heat Island Effect." *Resource, Conservation and Recycling* 64: 30-38
- Lowell, E. C., Dykstra, D. P., and Monserud, R. A. (2012), "Evaluating Effects of Thinning on Wood Quality in Southeast Alaska." *Western Journal of Applied Forestry* 27(2): 72-83
- Masuhara, N. (2010), "A Trial Agenda Regarding the Feasible Assessment of Taking a Measure towards Global Warming: An Example of Action Plans for Environmental Model Cities." *Environmental Science* 23(4): 314-320
- Nikkei Ecology. (2001), "Can Forestry Maintain its Independence and Protect the Forests?" *Nikkei Ecology* May 2001: 44-47
- Robles, R. J. and Kim, T. (2010), "Applications, Systems and Methods in Smart Home Technology: A Review." *International Journal of Advanced Science and Technology* 15: 37-47
- Sennes, V., Gombert-Courvoisier, S., Ribeyre, F., and Felonneau, M. (2012), "Citizens' Environmental Awareness and Responsibility at Local Level." *International Journal of Urban Sustainable Development* 4(2): 186-197
- Shinrin. (2014), "*Chiiki Tsuuka Mori Ken UneiJigyou* (Regional Currency Mori Coupon Project)," Accessed August 1, 2014. <http://shinrin.org/moriken>
- Toyota City. (2009), Summary of Action Plans towards an Environmental Model City. Accessed January 29, 2014. <http://www.city.toyota.aichi.jp/division/an00/an06/1252190/02gaiyosu.pdf>
- Toyota City. (2013), *Toyota City Guide Book 2013*. Toyota: Toyota City
- Toyota City. (2014a), "Toyota Ecoful Town has received 100,000 visitors." Accessed August 1, 2014. http://www.city.toyota.aichi.jp/pressrelease/1269606_7011.html
- Toyota City. (2014b), Toyota Eco-point System. Accessed August 4, 2014. <http://toyota-ecoful-town.com/english>

- Toyota City. (2014c), "Introduction about Toyota Ecoful Town." Accessed June 5, 2014. <http://toyota-ecofultown.com/english/>
- Toyota Motor Corporation. (2013), "Sustainable Plant." Toyota Motor Corporation. Accessed July 23, 2014. <http://www.toyotauk.com/environment/sustainable-plant.html>
- Toyota Motor Corporation. (2014), "Toyota's Environmental Action Plan." Accessed August 1, 2014 <http://www.toyota.co.jp/jpn/sustainability/environment/plan/>
- United Nations University. (2012), *Governance Challenges for Greening the Urban Economy: Understanding and Assessing the Links between Governance and Green Economy in Cities*. Yokohama: UNU-IAS