

Results of the 25th Annual "Questionnaire on Environmental Problems and the Survival of Humankind"

Report

THE ASAHI GLASS FOUNDATION

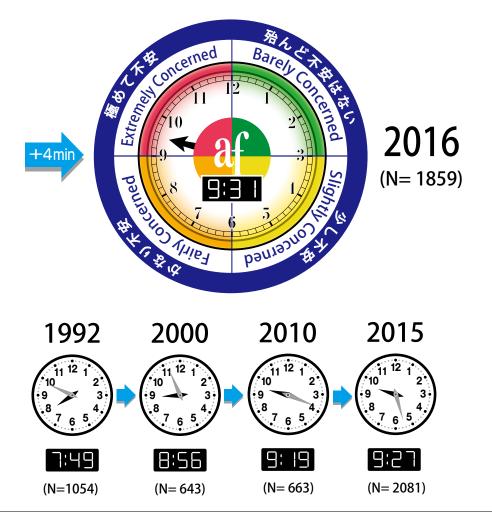
September 2016

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The Environmental Doomsday Clock

the sense of crisis felt about the continuance of the human race



Foreword

This report summarizes the results of the 2016 Questionnaire on Environmental Problems and the Survival of Humankind, a survey conducted annually by the Asahi Glass Foundation since 1992. As in previous years, the Asahi Glass Foundation wishes to continue communicating the current thoughts and opinions of environmental experts around the world on the state of the global environment to as many people as possible.

Thanks to the cooperation of the participants, we received 1,882 responses to the questionnaire this year. We would like to express our gratitude for the opportunity to report once again this year on an environmental survey covering most regions of the world.

This year, we started a new report on the respondent's choice of average time of the four quadrants of the Environmental Doomsday Clock. We continue to report on the correlations between the age of the respondents and the changes in time on the Environmental Doomsday Clock, an analysis that we began last year. In addition, we will also continue to report on the relationships between the "Environmental Condition of Concern" and the "Environmental Doomsday Clock" by region through the use of bubble charts, as well as on their changes from year to year.

And like last year, we have made available the comments the respondents have left on the Foundation's web site. As such, please visit the Asahi Glass Foundation online at http://www.af-info.or/questionnaire/result.html for the responses to Question 2 (Comments).

At the Foundation, we sincerely hope that we can contribute to the resolution of environmental problems using this questionnaire to raising environmental interest among as many people as possible, not limited to environmental experts.

Once again, we extend our deepest gratitude to the respondents for taking the time to share their valuable opinions and experience through the survey. In closing, we appeal to readers of this report for advice on how to enhance the survey in the coming years.

The Asahi Glass Foundation September 2016

I. Facts about the 25th Annual "Questionnaire on Environmental Problems and the Survival of Humankind"

Response period: Questionnaires were sent out in April 2016 with a return deadline of June 2016.

Questionnaire respondent pool: Environmental experts selected from members of government organizations, academic institutions, NGOs, corporations, and mass media (based on the Asahi Glass Foundation database).

Questionnaires mailed: 26,690 Questionnaires returned: 1,882

Response rate: 7.1%

Breakdown of respondents by region, gender, and occupational affiliation:

Region	Number of responses	Percent of total
Oceania	76	4.0
United States & Canada	265	14.1
Central America, Caribbean countries	42	2.2
South America	70	3.7
Western Europe	235	12.5
Africa	91	4.8
Middle East	32	1.7
Eastern Europe & former Soviet Union	50	2.7
Asia	1021	54.3
Total (Including three area unknown response	es) 1882	100.0
Gender		
Male	1364	72.5
Female	514	27.3
No response	4	0.2
Total	1882	100.0
Occupational Affiliation		
National government, Local government	234	12.4
University or research institution	633	33.6
Nongovernmental organization	424	22.5
Corporation	301	16.0
Mass Media	40	2.1
Others	244	13.0
No response	6	0.3
Total	1882	100.0

^{*1} Unless otherwise noted, the questionnaire calculated as 100% the total number of responses received for questions where respondents were only asked to choose one item. For questions with multiple selections, the questionnaire calculated the percentages based on the number of times a valid response was given.

^{*2} Figures have been rounded to the first or second decimal places.

^{*3} Each question was calculated based on the number of responses to that question and not the number of questionnaires that were returned.

II. Summary of Questionnaire Results

1. Awareness of the Crisis Facing Human Survival —The Environmental Doomsday Clock

- The average time on the Environmental Doomsday Clock for all the world was 9:31, an advancement of 4 minutes from last year.
- Overall, "climate change" continued from last year to be the most frequently selected environmental condition of concern in determining the time on the Environmental Doomsday Clock. This was followed by "biodiversity," "pollution/contamination," "water resources," and "land use."
- Overall, when arranging the top-ranked environmental conditions of concern in descending order of severity on the Environmental Doomsday Clock, "biodiversity" and "pollution/contamination" had the most advanced time of 9:37. These were followed by "population," then "climate change" and "land use."

2. Shifts in the Environmental Doomsday Clock Based on Respondent Age (new Repeat Topics category starting last year)

We analyzed the shifts in the time on the Environmental Doomsday Clock from 2011 to 2016 as marked by respondents around the world, with a particular focus on the age of the respondents.

- Similar to last year, older respondents tended to report more advanced times on the Environmental Doomsday Clock.
- The time on the Environmental Doomsday Clock for respondents between ages 20 and 40 has been advancing since 2011, reaching nearly the same levels as their counterparts aged between 40 and 60.

3. The Selection Rates for the Four Quadrants of the Environmental Doomsday Clock and the Changes in the Average Time (Survey item starting this year)

- The percentage of respondents who selected the quadrant "Extremely Concerned" has been increasingly nearly across the board. On the other hand, the percentage of respondents who selected the other quadrants is clearly on the decline.
- With the exception of the quadrant "Barely Concerned," the average time on the Doomsday Clock has not had significant changes and have been relatively stable.

III. Questionnaire Results

1. AWARENESS OF THE CRISIS FACING HUMAN SURVIVAL (QUESTION 1)

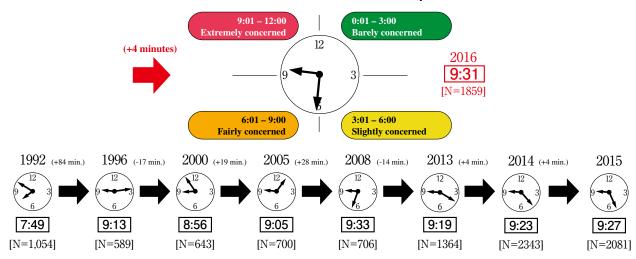
In Table 1, environmental issues to be taken into account are shown. Keeping in mind the problems that the environment faces at a global level, please select the three most pressing issues for the country or the region where you reside. Then, please rank them in the order of importance. Lastly, for each item, select a time using hours and minutes between 0:10 to 12:00, to indicate the level of crisis for that issue.

About the calculation of the time on the Environmental Doomsday Clock

The time on the Environmental Doomsday Clock will be determined by taking the weighted average of the data. The issue ranked in first place will be weighted at 50%, second place at 30%, and third place at 20%.

A-1. The Environmental Doomsday Clock

Concern about Human Survival Prospects

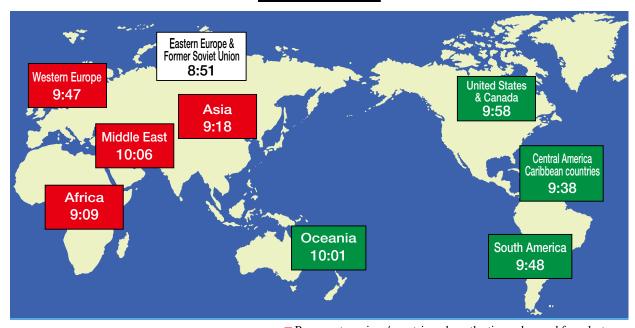


	Cl	nanges in	time from y	Changes in average time by region			
	'06	→	'15	→	'16	'06 → '16	'15 → '16
Total	9:17	→	9:27	→	9:31	+14	+4
Oceania	9:18	→	10:06	→	10:01	+43	-5
United States & Canada	9:18	\rightarrow	10:01	→	9:58	+40	-3
Central America, Caribbean countries	0.21*	\rightarrow	9:47	→	9:38	+7	-9
South America	9:31*	\rightarrow	9:54	→	9:48	+17	-6
Western Europe	9:08	\rightarrow	9:42	→	9:47	+39	+5
Africa	9:32	\rightarrow	9:00	→	9:09	-23	+9
Middle East	10:05	\rightarrow	9:10	→	10:06	+1	+56
Eastern Europe & former Soviet Union	9:07	\rightarrow	8:51	→	8:51	-16	±0
Asia	9:17	→	9:15	→	9:18	+1	+3

(Red indicates the advancement in time from last year; green indicates a reversal) *Central America, Caribbean countries and South America are comparisons with Latin America

• The average time on the Environmental Doomsday Clock for all respondents was 9:31, an advancement of 4 minutes from last year's time of 9:27.

Regional Times

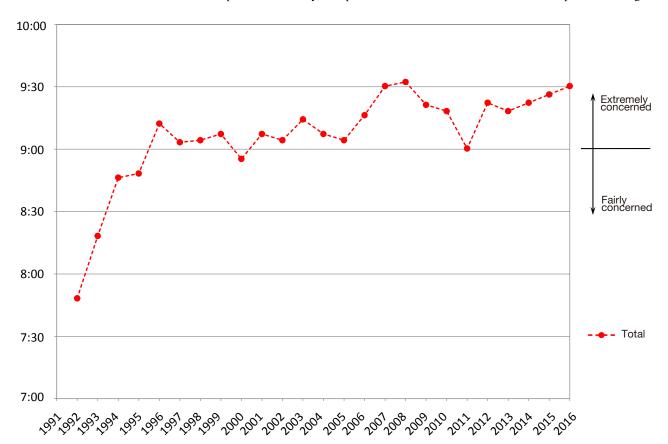


- Represents regions/countries where the time advanced from last year Represents regions/countries where the time retreated from last year
- ☐ Represents regions/countries where the time remained the same

Changes in the Environmental Doomsday Clock (Overall)

19	92	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
7:4	49	8:19	8:47	8:49	9:13	9:04	9:05	9:08	8:56	9:08	9:05	9:15	9:08	9:05	9:17	9:31	9:33	9:22	9:19	9:01	9:23	9:19	9:23	9:27	9:31

Since the inception of the survey, represents the lowest sense of crisis, while represents the highest.



A-2. Shifts in the Environmental Doomsday Clock Based on Respondent Age (2011 - 2016)

• The older the respondents were, the more they tended to report advanced times on the Environmental Doomsday Clock.

A-2-1. Shifts in the Environmental Doomsday Clock By Generation

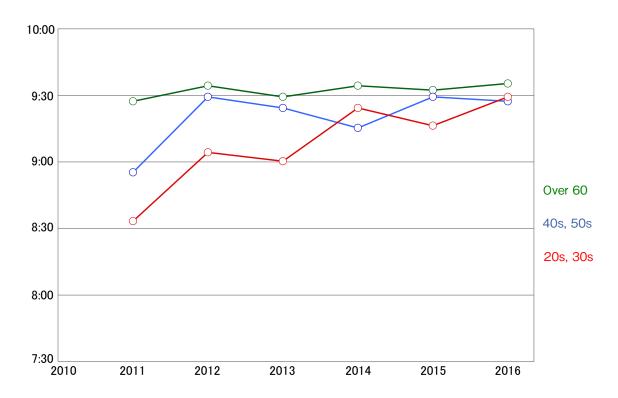
- Shifts in time on the Environmental Doomsday Clock for respondents over the age of 60 were relatively stable and were within the range of 9:28 to 9:36.
- For respondents of the age group of 40s, 50s, the Environmental Doomsday Clock advanced from 8:56 in 2011 to 9:30 one year later, but the times have remained relatively stable since then.
- The Environmental Doomsday Clock time for respondents between the ages of 20 and 40 has been advancing from 2011, when it was 8:34, to 2016. In 2016, respondents in this age group selected times that reached nearly the same levels as chosen by their counterparts, age group of 40s, 50s.

The Effects of Each Generation on the Environmental Doomsday Clock

• From 2015 to this year, the time on the Environmental Doomsday Clock advanced 4 minutes from 9:27 to 9:31. A large part of this movement can be attributed to respondents between the age group of 20s, 30s, and those over age 60.

Shifts in the Environmental Doomsday Clock by Generation

	2011	2012	2013	2014	2015	2016
Average Time	9:01	9:23	9:19	9:23	9:27	9:31
Over 60	9:28	9:35	9:30	9:35	9:33	9:36
40s, 50s	8:56	9:30	9:25	9:16	9:30	9:28
20s, 30s	8:34	9:05	9:01	9:25	9:17	9:30

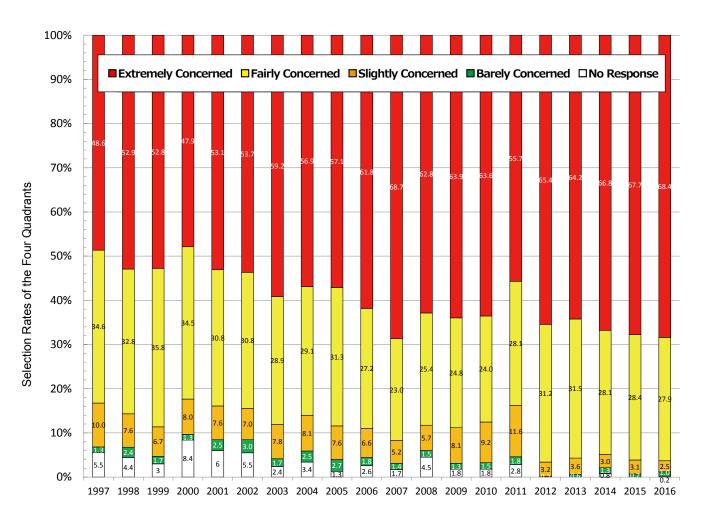


A-3. Starting this year, this report will include an analysis of the percentage of respondents who chose each of the four quadrants of the Environmental Doomsday Clock (0:01 – 3:00: "Barely Concerned," 3:01 – 6:00: "Slightly Concerned," 6:01 – 9:00: "Fairly Concerned," 9:01 – 12:00: "Extremely Concerned"), as well as the changes in the average time within each quadrant.

A-3-1. Changes in Selection Rates of the Four Quadrants (1997 – 2016)

- The percentage of respondents who selected the quadrant "Extremely Concerned" has been on a growth trajectory, from 48% in 1997 to just under 70% this year. The percentage of respondents who selected the other quadrants is clearly on the decline.
- The one notable exception took place in 2011, when the percentage of respondents who selected "Extremely Concerned" fell unequivocally, by 7.9% from the previous year. The average time on the Environmental Doomsday Clock that year was 9:01, a retreat of 18 minutes compared to the previous year.
- The combined percentages of respondents who selected "Fairly Concerned" and "Extremely Concerned" reached more than 95% after 2012, indicating a clear sense of concern among a large majority of respondents.
- Moreover, the combined percentages of respondents who selected "Barely Concerned" and "Slightly Concerned" have remained under 4% after 2012. This represents a clear decline compared to the years before 2011. Similarly, the quadrant "Barely Concerned" was selected by 1.3% to 3.0% of respondents before 2011, which has declined to between 0.2% 1.3% after 2012.

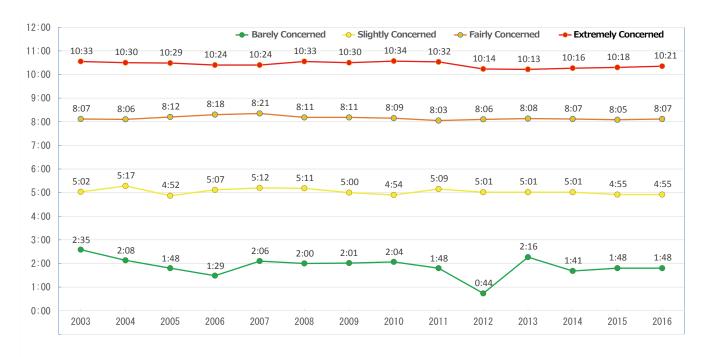
Changes in the Selection Rates of the Four Quadrants of the Environmental Doomsday Clock (%)



A-3-2 Changes in the Average the Environmental Doomsday Clock Time in the Four Quadrants (2003 - 2016)

- Following the changes in each quadrant of the Environmental Doomsday Clock shows that the changes in the "Extremely Concerned," "Fairly Concerned," and "Slightly Concerned" quadrants have been stable. On the other hand, the "Barely Concerned" quadrant has showed a large retreat from 2011 to 2012, of 1 hour 4 minutes. Conversely, the quadrant recorded an extremely accelerated advancement of 1 hour 32 minutes from 2012 to 2013.
- The selection rate of the "Barely Concerned" category among all respondents remained between 1.3% to 3.0% until 2011, whereas the percentages varied from 0.2% to 1.3% after 2012. Because the small number of respondents does not offer a stable statistic data, we believe that the changes in the time are greater in this quadrant compared to the other three.

Changes in the Average the Environmental Doomsday Clock Time in the Four Quadrants



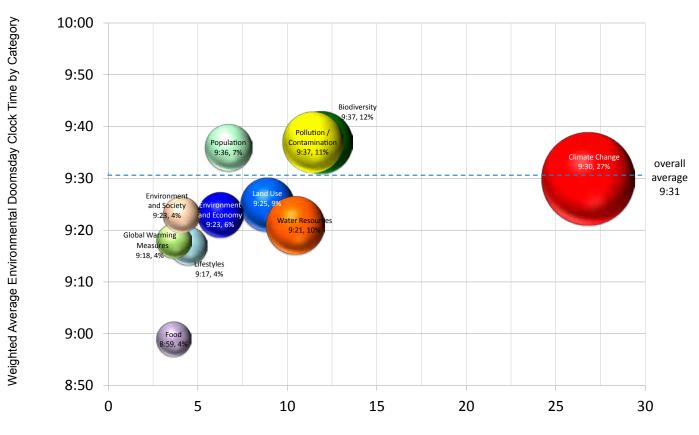
B. Environmental Conditions of Concern

	Category	Examples of Observable Changes in the Country or the Region in which You Reside
1.	Climate Change	Atmospheric concentration of CO ₂ ; global warming; ocean acidification; climatic aberrations (droughts, torrential rains and flooding, severe storms, heavy snow, abnormal temperatures, drying of rivers and lakes, desertification, etc.)
2.	Biodiversity	Acceleration of species extinction rate; effects of contamination, climate change, land use
3.	Land Use	Expansion of cultivated land mass; destruction of forests due to excessive development; desertification caused by overgrazing; agriculture and land use without regard for the environment; urbanization
4.	Pollution / Contamination	River and ocean pollution: eutrophication caused by excessive nitrogen and phosphorus and contamination by chemical substances; atmospheric pollution : particulates suspended in the atmosphere, soot and chemical substances
5.	Water Resources	Diminution of usable fresh water resources (depletion, contamination)
6.	Population	Population growth beyond what the Earth can support; aging of the population
7.	Food	Diminution of food supply from land and oceans
8.	Lifestyles	Transformation of lifestyles away from excessive consumption of resources like energy
9.	Global Warming Measures	Progress of measures for mitigation and adaption
10.	Environment and Economy	Progress towards implementing an economic system to reflect environmental costs, the bearing of social costs: imposition of taxes for fossil fuels that emit CO ₂ , which causes global warming-related damages; TEEB (The Economics of Ecosystems and Biodiversity), etc. The operation of an environmentally conscious economy: the realization of a green economy, sustainable economic development, etc.
11.	Environment and Society	Environmental awareness at the individual and societal levels, progress of environmental education; poverty , governance ; the status of women
12.	Other	(

Terms in **blue** are categories listed in "Planetary Boundaries" (Johan Rockstrom, et al. : Ecology and Society 14 (2):32, 2009); those in **green** are the major categories of SDG(Sustainable Development Goals of United Nations).

1. Overall Analysis of the Environmental Conditions of Concern (Categories Ranked 1 - 3)

Graph 1. Overall (2016)



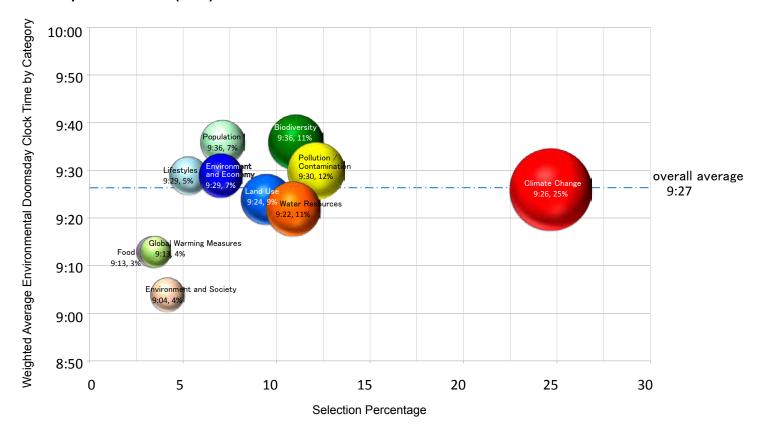
• Arranging the environmental conditions of concern in order of the selection rate showed that overall, "climate change" continued from last year to be the most frequently selected issue, at 27%. This was followed by "biodiversity" (12%), "pol-

Selection Percentage

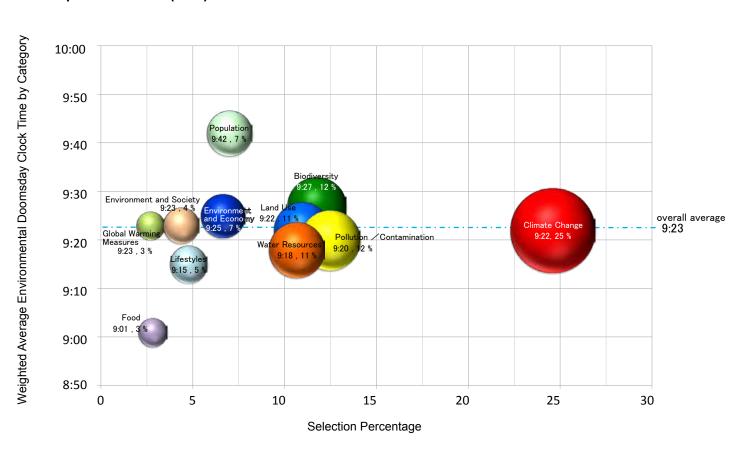
• "Biodiversity" and "pollution/contamination" had the most advanced time of 9:37. These were followed by "population" at 9:36, indicating a heightened sense of crisis. The distribution of the Doomsday Clock time for the other issues ranged between 8:59 and 9:30.

lution/contamination" (11%), "water resources" (10%), and "land use" (9%).

Graph 2. Reference (2015)

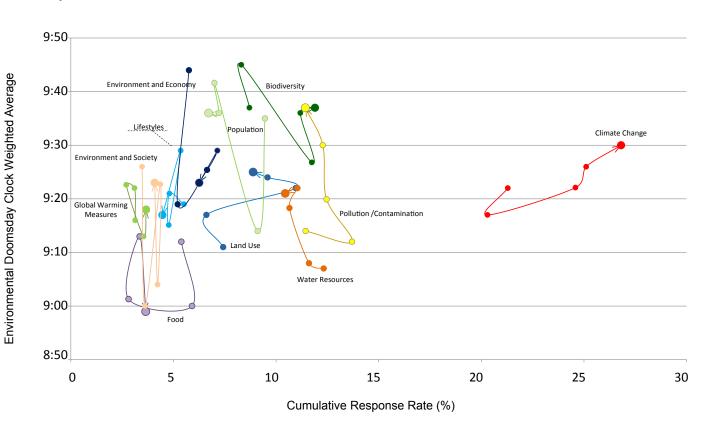


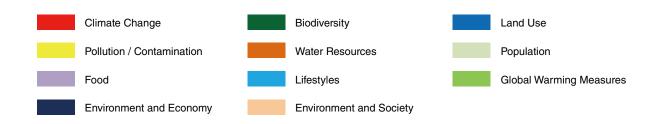
Graph 3. Reference (2014)



2. Distribution of the Environmental Conditions of Concern (2012 - 2016)

Graph 4.





3. Selection Patterns for Environmental Conditions of Concern By Region

	1.Climate Change	2.Biodiversity	3.Land use	4.Pollution/ Contami- nation	5.Water resources	6.Popula- tion	7.Food	8.Lifestyle	9.Global warming measures	10.Environment and economy	11.Envi- ronment and Society
Total	27%	12%	9%	11%	10%	7%	4%	4%	4%	6%	4%
Oceania	31%	16%	7%	4%	11%	10%	2%	3%	2%	6%	6%
Australia	32%	13%	5%	4%	10%	14%	2%	3%	3%	6%	7%
Oceania (except Australia)	29%	21%	11%	6%	15%	1%	1%	0%	0%	7%	3%
United States & Canada	34%	12%	7%	6%	13%	11%	1%	4%	2%	7%	3%
USA	33%	12%	7%	6%	14%	12%	1%	3%	2%	6%	3%
Canada	38%	13%	7%	5%	8%	6%	1%	6%	3%	9%	3%
Central America, Carribean countries	28%	13%	15%	5%	17%	6%	3%	4%	2%	3%	3%
South America	20%	18%	23%	5%	13%	3%	2%	2%	2%	5%	4%
Western Europe	26%	18%	15%	6%	5%	9%	1%	7%	1%	7%	4%
UK	26%	16%	14%	6%	2%	14%	1%	6%	2%	7%	5%
Western Europe (except UK)	25%	19%	15%	7%	7%	7%	1%	7%	1%	7%	4%
Africa	31%	16%	13%	8%	12%	5%	5%	1%	1%	3%	3%
Middle East	25%	17%	13%	3%	30%	4%	1%	3%	0%	3%	1%
Eastern Europe & former Soviet Union	14%	17%	14%	11%	12%	2%	2%	4%	1%	14%	8%
Asia	26%	9%	6%	16%	10%	6%	5%	5%	5%	6%	4%
India	21%	17%	12%	8%	15%	11%	2%	1%	2%	3%	6%
China	16%	3%	4%	29%	13%	4%	7%	5%	6%	7%	3%
Taiwan	25%	5%	13%	22%	10%	3%	4%	3%	6%	4%	4%
Republic of Korea	38%	16%	4%	10%	1%	5%	2%	16%	0%	6%	2%
Japan	33%	11%	4%	8%	5%	7%	6%	5%	7%	7%	6%
Asia*	26%	14%	13%	9%	17%	6%	3%	2%	3%	4%	3%

[■] Represents the most frequently selected item in the region/country, ■ represents the second most frequently selected item in the region/country

*With the exception of India, China, Taiwan, Korea, and Japan

[•] Overall, "climate change" was the most frequently selected issue at 27%. This was followed by "biodiversity" (12%), "pollution/contamination" (11%), "water resources" (10%), and land use (9%)

[•] While "climate change" was the most frequently selected issue in a large majority of regions, respondents in China most frequently cited "pollution/contamination," respondents in South America selected "land use," respondents in the Middle East selected "water resources," and respondents in Eastern Europe and the former Soviet Union selected "biodiversity.

[•] In many regions, biodiversity was the second most frequently selected environmental condition of concern.

4. Regional Distribution of the Environmental Doomsday Clock Time for Environmental Conditions of Concern

	Total	1.Climate Change	2.Biodiversity	3.Land use	4.Pollu- tion/ Contami- nation	5.Water resources	6.Popula- tion	7.Food	8.Lifestyle	9.Global warming measures	10.Envi- ronment and economy	11.Envi- ronment and Society
Total	9:31	9:30	9:37	9:25	9:37	9:21	9:36	8:59	9:17	9:18	9:23	9:23
Oceania	10:01	10:12	9:34	10:05	8:47	9:19	10:03	8:58	10:06	9:50	10:25	9:42
Australia	10:05	10:27	10:34	10:52	-	9:48	10:03	-	10:06	9:50	10:45	9:24
Oceania (except Australia)	9:52	8:46	9:08	9:36	9:18	8:19	-	-	-	-	9:57	-
United States & Canada	9:58	10:06	10:13	9:36	9:31	9:24	10:04	9:33	-	10:13	9:27	9:48
USA	10:03	10:06	10:18	9:36	9:44	9:26	10:13	9:48	-	10:15	9:28	9:51
Canada	9:41	10:17	10:09	9:43	8:54	8:42	9:05	-	-	10:06	8:32	-
Central America, Carribean countries	9:38	9:06	9:17	9:24	-	9:19	9:51	-	9:16	-	9:10	-
South America	9:48	9:56	9:56	9:50	10:07	10:09	6:29	8:53	-	-	10:23	9:47
Western Europe	9:47	9:47	9:53	9:59	9:19	9:40	9:49	8:24	9:32	-	9:19	10:01
UK	10:00	9:57	9:52	9:51	9:03	-	9:58	-	10:24	-	9:34	-
Western Europe (except UK)	9:42	9:44	9:53	10:02	9:32	9:37	9:43	8:19	9:16	-	9:05	9:53
Africa	9:09	9:10	9:06	8:24	9:15	9:32	9:53	9:34	-	-	-	9:55
Middle East	10:06	9:29	9:53	10:09	-	10:32	11:33	-	-	-	-	
Eastern Europe & former Soviet Union	8:51	8:32	9:18	8:19	9:41	8:40	-	-	9:12	-	8:38	9:29
Asia	9:18	9:14	9:19	9:15	9:35	9:11	9:11	8:54	8:57	9:09	9:17	9:09
India	9:36	9:33	8:54	9:46	9:20	9:34	10:21	9:40	-	-	10:55	9:30
China	9:39	9:47	9:23	9:34	10:02	9:22	8:55	9:14	8:33	9:45	9:26	9:28
Taiwan	8:53	8:45	8:44	9:04	8:50	9:07	9:32	7:56	9:44	9:42	9:35	9:15
Republic of Korea	9:47	9:40	9:45	-	9:41	-	10:20	-	9:45	-	-	10:27
Japan	9:03	9:03	9:19	8:33	8:59	8:02	9:16	8:45	9:05	8:56	9:03	9:01
Asia*	9:12	9:05	9:16	9:16	9:50	9:31	8:09	8:47	9:32	7:01	8:29	9:16

[■] Indicates the 11 o'clock hour, \blacksquare indicates the 10 o'clock hour, \blacksquare indicates the 8 o'clock hour , and \blacksquare the 7,6 o'clock hour)

• Overall, "biodiversity" and "pollution/contamination" were the issues with the highest sense of crisis at 9:37. These were followed by "population" (9:36), "climate change" (9:30), and "land use" (9:25). With the exception of "food problems" (8:59), all categories were distributed within a relatively narrow range of time between 9:17 and 9:37.

Regions and Countries Expressing a High Degree of Crisis

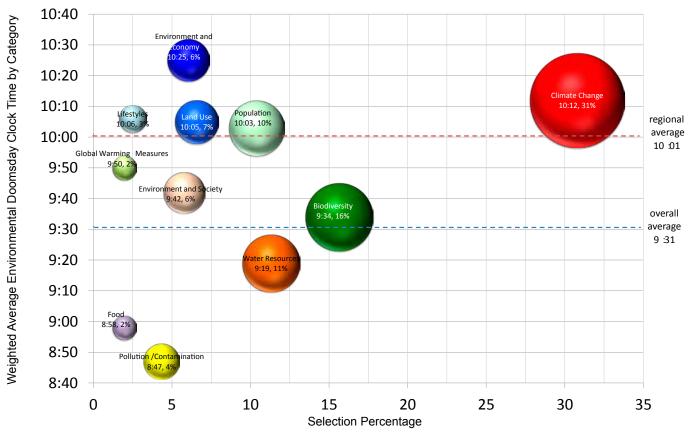
	Regions Indicating an Environmental Doomsday Clock Time Past 10 O'clock
1. Climate Change	Australia, United States & Canada
2. Biodiversity	Australia, United States & Canada
3. Land use	Australia, Western Europe (except UK), Middle East
4. Pollution/Contamination	China, South America
5. Water resources	South America, Middle East
6. Population	India, Korea, Australia, USA, Middle East
7. Food	
8. Lifestyle	Australia, UK
9. Global warming measures	United States & Canada
10. Environment and economy	India, Australia, South America
11. Environment and society	Korea, Western Europe

• While "climate change" was the most frequently cited condition of concern, its time on the Environmental Doomsday Clock was the fourth most advanced, at 9:30.

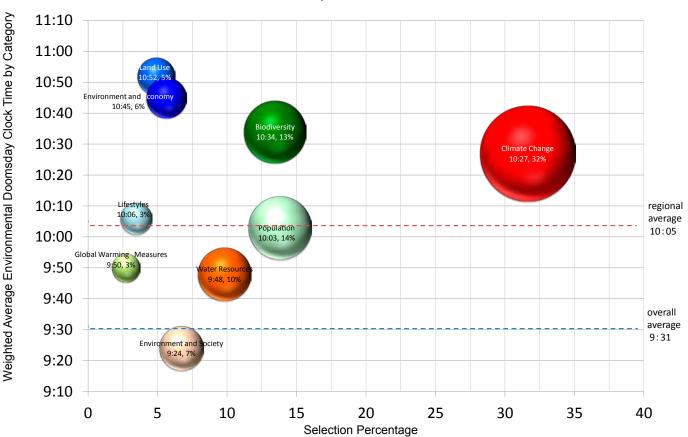
^{*}With the exception of India, China, Taiwan, Korea, and Japan

Reference)Distribution of the Environmental Conditions of Concerns by regions

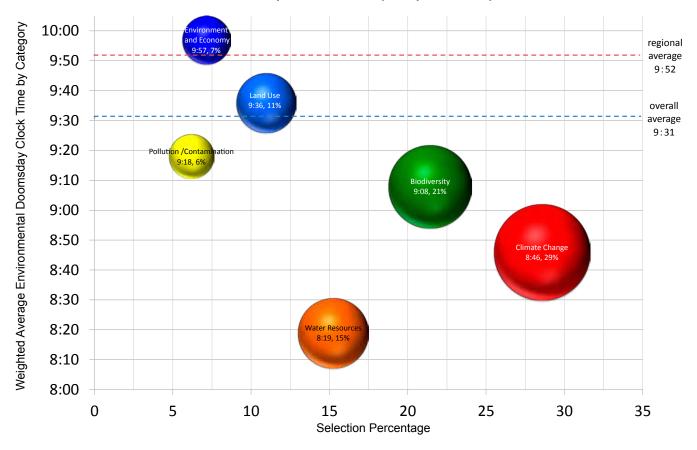
Graph 5-1. Oceania



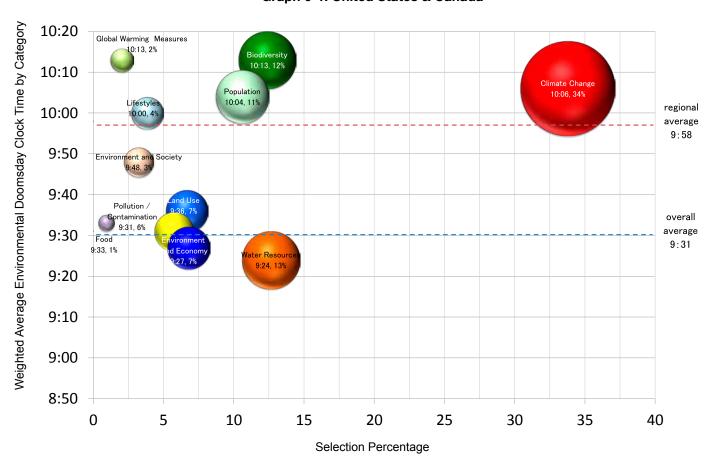
Graph 5-2. Australia



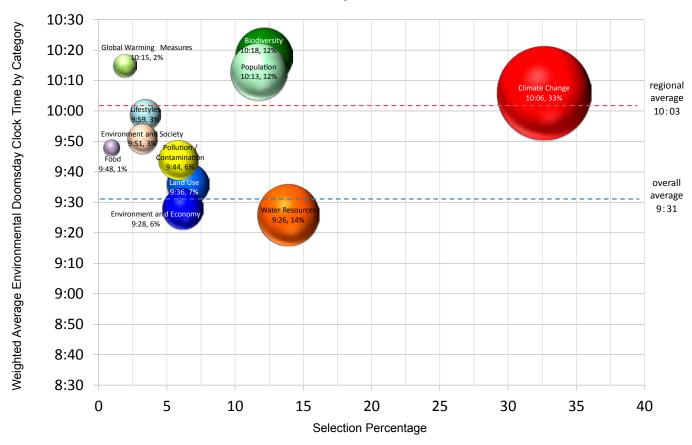
Graph 5-3. Oceania (Except Australia)



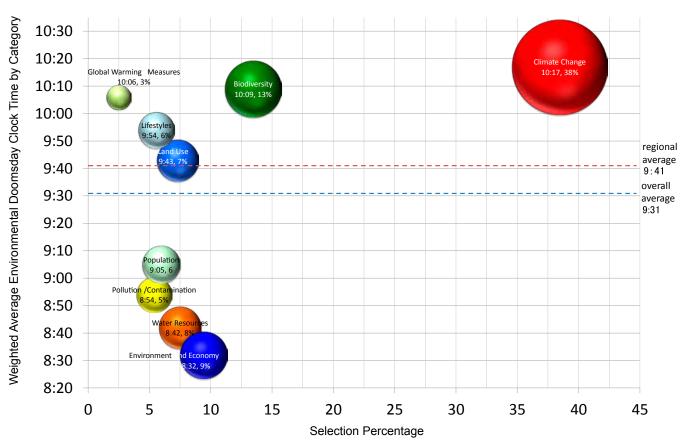
Graph 6-1. United States & Canada



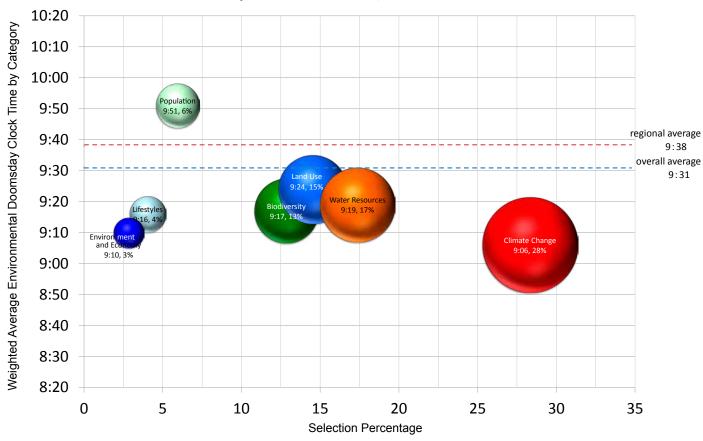
Graph 6-2. USA



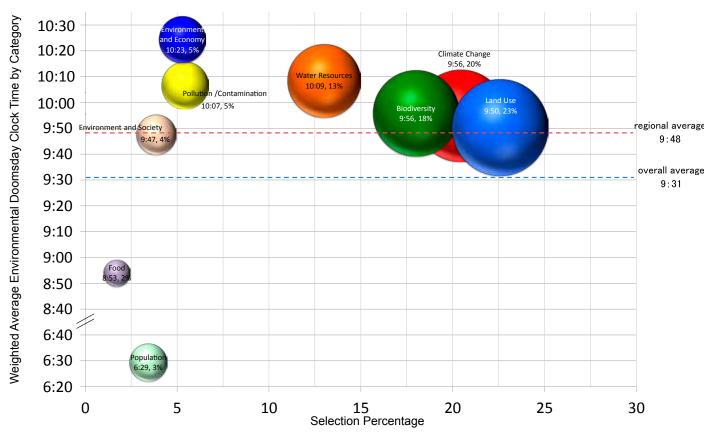
Graph 6-3. Canada



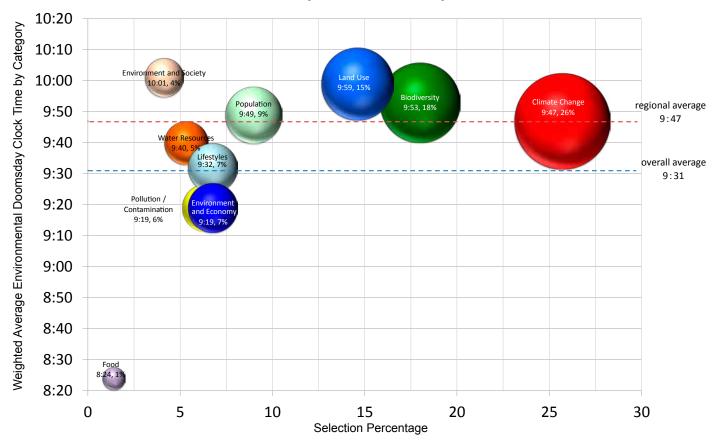
Graph 7. Central America, Caribbean countries

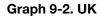


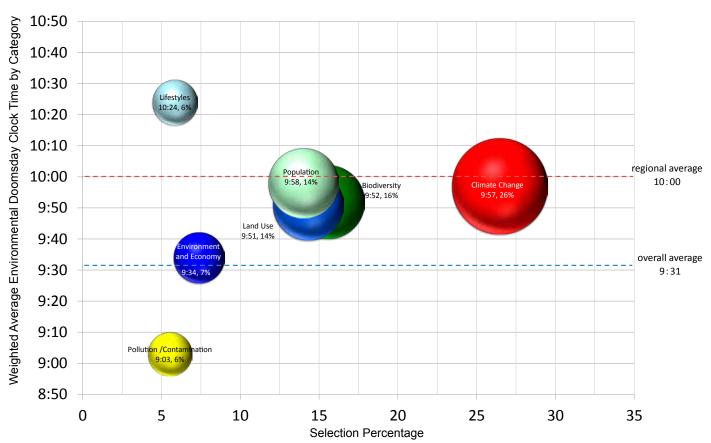




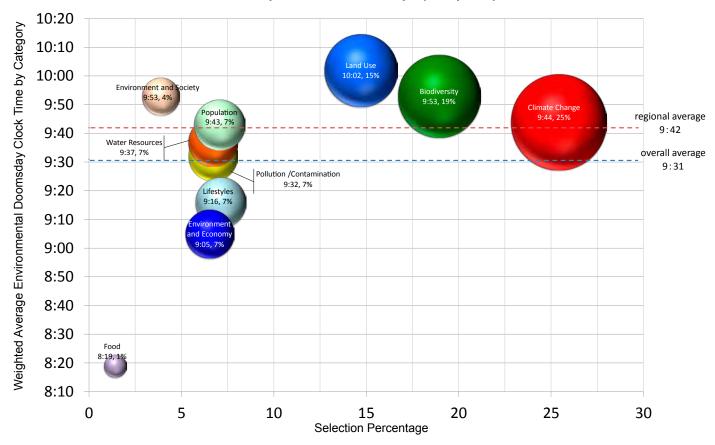
Graph 9-1. Western Europe



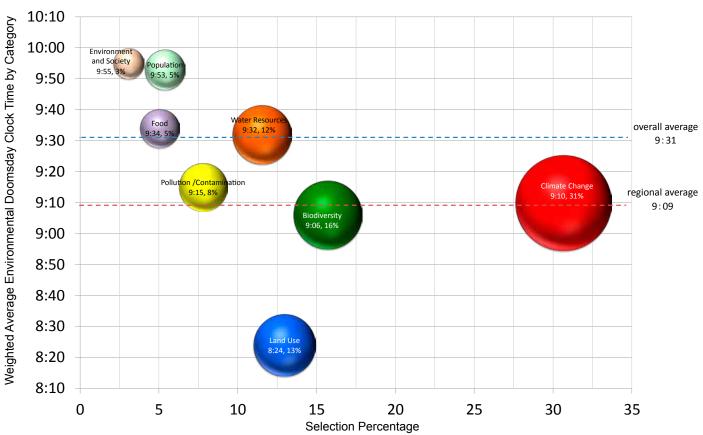




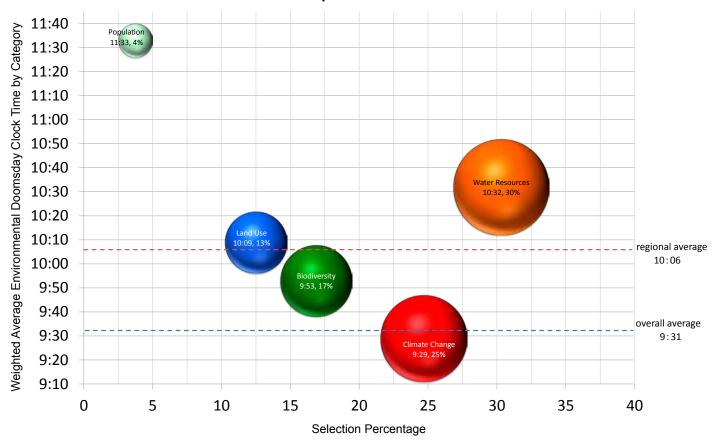
Graph 9-3. Western Europe (except UK)



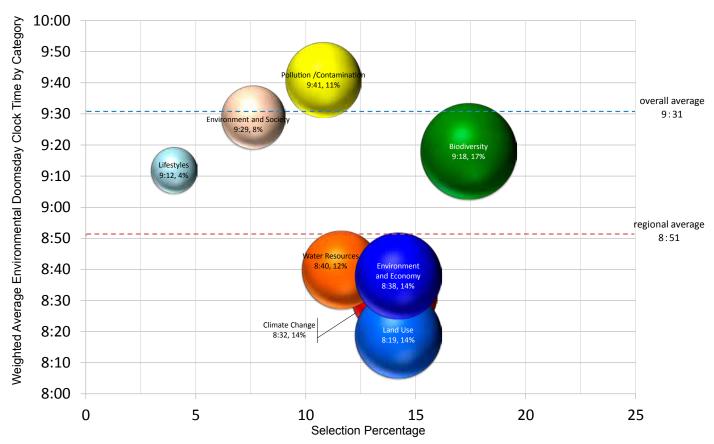




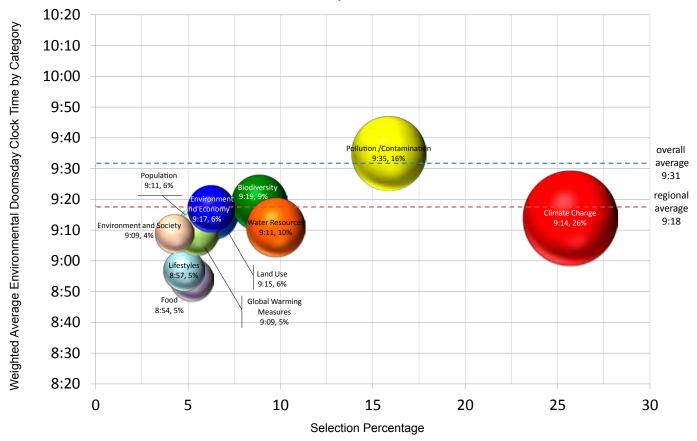




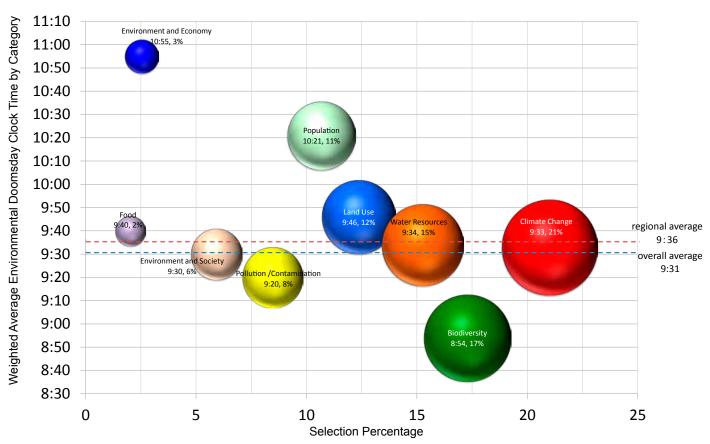
Graph 12. Eastern Europe & former Soviet Union



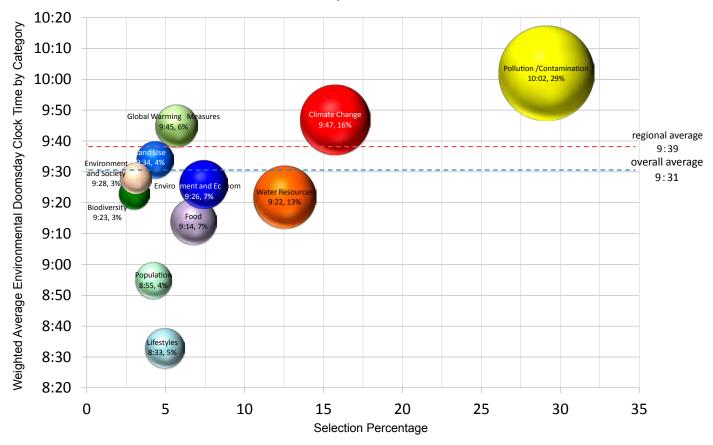




Graph 13-2. India



Graph 13-3. China



Graph 13-4. Taiwan

