

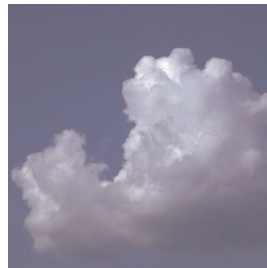
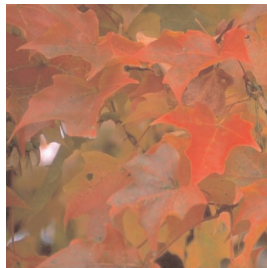


Environment
Canada

Environnement
Canada

Canada

■ *Survey of Emerging Environmental Issues*



Survey of Emerging Environmental Issues

Prepared by Praxis Inc.

Praxis

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■ Survey of Emerging Environmental Issues

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Summary Highlights

- In a global context, climate change was named as the most important environmental issue in the next five years. It was the second most important issue in a regional context.
- Climate change was identified as the top agenda item for international environmental negotiations over the next five years.
- Climate change was named as the top priority for future scientific research in the next five years.
- In a regional context, respondents indicated that issues related to water would be the most important in the next five years. In a global context, water related issues were identified as the second most important.
- In Canada, the nature of water issues related mostly to water quality. Respondents outside Canada identified quality and quantity as significant water related issues.
- Respondents indicated that over the next five years, issues related to water would be second on the international environmental negotiation agenda.
- Water availability was considered to be the issue that will increase most in significance in the future.
- Irrespective of their individual discipline or areas of expertise, water quality was identified as the most critical issue among all of the experts surveyed.
- Canadian respondents named water quality as the most prominent issue for current and future policy debate.
- Respondents indicated that water related issues should be one of the top priorities for scientific research in the next five years.
- The transportation of airborne toxins, which has been the focus of much attention within Environment Canada in the recent past, was not considered as important as issues related to climate change and urban air quality.
- American and international participants regarded air quality as most significant for current and future policy debate.
- Experts indicated that the significance of all current environmental issues will increase in the future.
- Scientific information related to biotechnology and biodiversity was considered to be least credible among the issues identified.

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1.0 Introduction

1.1 Background to the Project

Environment Canada (EC) has the mandate for preservation and enhancement of the quality of the natural environment, renewable resources, meteorology, enforcement of the rules of the Canada-U.S. International Joint Commission, and coordination of federal environmental policies and programs.

While the Department's mandate has not changed since it was founded in 1971, the range and character of the issues and challenges it faces have evolved considerably. Where environmental issues were once mainly local and regional in scope, they have now become global and interconnected. Resolution of these issues now requires the commitment of the international community. For example, pollutants are carried from other countries through the atmosphere and threaten vulnerable Canadian ecosystems and populations such as those of the North.

Environment Canada is first and foremost a science-based department and scientific knowledge is the foundation for its policy choices, technological solutions, services, and operations. This capacity to understand and interpret based on scientific knowledge is of central importance to its work in policy, regulation, and services. Early detection of emerging environmental issues and problems before they become unmanageable is critical to its ability to fulfil its mandate to Canadians. A sound way to obtain information is to consult with leading international experts working in Environmental Knowledge Centres

or other centres of excellence located around the world.

1.2 Survey Objectives

In order to detect emerging environment issues, Environment Canada contracted Praxis Research, a Calgary based consulting company, to contact approximately 100 of the world's most respected Environmental Knowledge Centres (EKCs) and individual environmental experts and identify their perceptions about the most important emerging environmental issues in the next five to ten years.

Environment Canada intends to conduct this research annually to provide ongoing trend information that will be used by Environment Canada and its partners.

The survey results will form part of the annual environmental trends information that will be delivered by Environment Canada's Policy Research Directorate and will be used by Environment Canada in its departmental planning process. In addition, the information gathered in the survey will be a useful tool to Environment Canada's partners in this project and will provide information of interest to other Government Departments and survey participants.

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2.0 Survey Methodology

2.1 Survey Design

A pilot survey of just under 20 EKC's was conducted to test the methods, questions and applicability of information in June 2000. The information obtained from the pilot survey was used as the basis for the current survey.

The survey was structured in a way that would not limit the nature of responses (as would be the case if all the questions were set up as Likert scales with pre-set categories). Most questions were designed to obtain the respondent's perspective on emerging environmental issues in an open-ended format, as well as to provide supporting information for their assessment. Another feature of the survey design was to allow flexibility in the method of completion. During past surveys of senior audiences, Praxis has found that offering the respondent a choice of survey completion methods increased response rates. For this reason respondents could complete the survey on-line, through a telephone interview or on a paper form (fax-back), whichever they found most convenient. The consideration of bias associated with use of self-completed vs. interviews was considered less important than obtaining results from the individual experts. Since a great deal of effort went into identifying and contacting the respondents, obtaining the highest possible return rate was a high priority.

2.2 Sample Frame and Database

Praxis developed an internet-based relational database, designed to be used at all stages of the project. The database included contact information for each participant that was linked to each survey participants' individual response form. Each potential participant was provided with an on-line link to the survey site and a password to access their individual response form, allowing the individual completing the survey on-line to directly input their information into the database. Surveys completed in hard copy (fax-back or telephone interview) were input into the database by Praxis.

The relational database was password protected for security and access reasons. However, using specially designed links and passwords, EC and Praxis were able to access the databases at all times to monitor completion rates and overall progress.

2.3 Selecting and Ranking Survey Respondents

Based on the review of a variety of pre-existing contact lists of environmental experts and EKC's, EC and Praxis collectively developed a project specific contact list of over 500 potential participants. Potential participants were drawn from Canada, the United States, Europe and other international sources. To ensure the contact list was balanced from a geographic perspective and included balanced representation from a variety of sectors, EC and Praxis independently reviewed the list, ranking each participant as first or

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second priority, or deleting unsuitable candidates. This ranking process culled the contact list to 370 potential participants including, 200 first priority contacts and 170 second priority contacts.

All contact information was entered into the relational database. Where information was missing, telephone contact was made with the individual/organization to verify, complete or update information.

2.4 Contacting Potential Participants

During the last week of May 2001, an email letter of invitation for participation was sent to each of the potential participants with email addresses. The letter of invitation: introduced participants to the project, informed them of the objectives, offered a variety of options for completing a survey (personal interview, on-line, fax-back), and provided each individual with an internet link and password to complete the survey on-line. Those individuals without an email address were sent letters of invitation by fax.

Within five days of receiving a letter of invitation, first priority participants were contacted by telephone. The purpose of the telephone contact was: to ensure the email/fax letter of invitation had been received, to

determine if the individual was willing to participate in the survey, and to identify the individual's preference for participation.

During the first week of June, a reminder letter was emailed or faxed to each of the potential participants. Following the reminder notice, first priority contacts received a second telephone call to encourage participation. In addition, second priority contacts received an initial telephone call to: ensure the email/fax letter of invitation had been received, determine if the individual was willing to participate in the survey, identify the individual's preference for participation, and to encourage participation.

During the first two rounds of telephone contacts, participants who indicated that they would be completing the survey in the future were recorded by the telephone interviewer as 'pending'. Prior to the June 15th survey deadline, participants with pending status received an additional reminder telephone call.

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3.0 Summary of Results

3.1 Survey Results

The deadline for completion of the survey was June 15th, 2001. However, in an effort to include as many individuals as possible, participants were told that they would be able to submit their results after that date and, where possible, their contributions would be included in the analysis. At the time of the survey deadline, 108 survey response forms had been completed. Of the 108 completed surveys, 75% were from Canada, 18% from the United States, and 7% were from other countries.

3.2 Analysis of the Results

The results of the 108 completed survey responses were compiled by question in the database. Output for the qualitative, open-ended questions included the verbatim written responses from each respondent.

The written responses for each of the open-ended questions were reviewed and grouped into thematic categories. For example: responses related to water quality, water quantity, water management, water conservation, etc. were grouped together as water related issues. Similarly, responses related to greenhouse gases, global warming, reduction in ozone, etc. were grouped together under the broad thematic category of climate change. Some of the responses overlapped or had interlinkages with more than one thematic category. For example, a response that identified greenhouse gases as the primary issue may have also mentioned air quality issues.

In order to identify the frequency of responses, each comment was categorized according to the primary thematic category. The frequency of response was identified by considering the number of times the thematic category was identified in relation to the total survey sample. The open-ended questions allowed participants to provide up to three responses, but did not ask the respondent to prioritize their answers. Consequently the frequency results indicate how often the thematic category was identified.

Because the information gathered in the open-ended questions involves the opinions and perspectives of the individual respondents, the analysis is qualitative and not statistically valid. In addition, the qualitative analysis was based on separating the written responses into themes. The researcher identified the common themes by grouping similar words and phrases. It is recognized that in order to provide a more robust analysis, the resulting themes should be verified with other researchers.

Quantitative results were output in numerical frequency tables. A statistical package (SPSS) was used to determine the mean scores for each question. These mean scores are explained in this report via graphs and / or tables.

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3.3 Summary of Results by Question

The summary results for the qualitative, open-ended questions are presented on a question-by-question basis. For each question, an overview of the five most frequently cited responses is provided, followed by a textual explanation of the results that includes fractional descriptions of the frequency of responses by thematic category. To give a flavor of the content and range of individual responses, 'quotable quotes' or representative examples of the verbatim responses for the three most frequent responses have been provided for each of the qualitative questions. Attributions, including: last name, organization and country; have been included for each quote, where appropriate. It is worthy noting that 55 of the 108 survey respondents requested that their names be withheld. In these cases, only the country has been attributed.

The quantitative results are illustrated through the use of graphs and tables. For each question an analysis is provided based on the participants as a whole, as well as by discipline and by country. Due to the small sample size, some of the disciplines and countries had fewer than five respondents. Therefore, the analysis of responses by discipline and country should be interpreted cautiously. Any category of less than 10 respondents is indicated with a '*'. (The analysis by discipline is provided in Appendix II.)

Question 1.1

In the next five years, in your professional opinion, what will be the three most important environmental issues in your country or jurisdiction?

Question 1.1

Examples of the range of responses for the three most frequently mentioned environmental issues of importance in the next five years in the respondents' country or jurisdiction are captured in the following sample of "quotable quotes".

Water Related Issues

"The quality and quantity of water available for use by Canadians including: domestic, agricultural, municipal, industrial."

– **Name withheld** (Canada)

"Drinking water quality – need for stricter standards and stronger enforcement."

– **Name withheld** (Canada)

"Water pollution especially potable sources and coastal area."

– **Name withheld** (Jamaica)

"Water management: irrigation; environmental flows; water quality; allocating water resources."

– **Vanclay** ■ Center for Rural Social Research, Charles Sturt University (Australia)

Climate Change

"Climate change including: international negotiation, establishment of co-operative implementation scheme for emissions trading and others, and domestic actions (legal framework)."

– **Kajihara** ■ Japan Environment Agency (Japan)

"Preventing climate change and attendant problems."

– **Mitchell** ■ Centre for Environmental Science & Policy, Stanford University (USA)

"Climate change and greenhouse gas reduction."

– **Name withheld** (Canada)

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The five most frequently mentioned responses to the most important environmental issues in the next five years in the respondents' country or jurisdiction, in order of frequency of response, were:

1. Water Related Issues
2. Climate Change
3. Air Quality
4. Biodiversity
5. Energy Issues

Of the 108 individuals who provided their opinion, three quarters indicated that issues related to water (e.g. quality, quantity, conservation, management, etc.) will be one of the three most important environmental issues in their country or jurisdiction in the next five years. The second most frequent response was climate change (e.g. global warming, greenhouse gases, emissions), which was cited by just under half of the respondents. This was followed in frequency of response by issues related to air quality, mentioned by one third of the respondents. One quarter of the participants suggested that biodiversity will be an important issue in the next five years. Issues related to energy (e.g. conservation, alternative sources, etc.) were cited by about an eighth of the respondents.

Question 1.2

In the next five years, in your professional opinion, what will be the three most important environmental issues on a global scale?

The five responses most frequently mentioned related to the most important environmental issues in the next five years on a global scale, in order of frequency of response, were:

1. Climate Change
2. Water Related Issues
3. Biodiversity

Question 1.1 (continued)

“Climate change: over consumption and heavy reliance in fossil fuels is not declining.”

– **Name withheld** (Canada)

Air Quality

“Air quality as a national and regional issues with climate change as the subtext.”

– **Wiebe** ■ Asia Pacific Foundation of Canada (Canada)

“Air pollution from industry, automobiles and energy production.”

– **Name withheld** (Canada)

“Regional air quality will decline significantly due to failure to manage population growths and increases in airborne emissions.”

– **Healy** ■ University of British Columbia, Westwater Research Centre (Canada)

Question 1.2

Representative examples of the range of responses for the three most frequently mentioned environmental issues of importance in the next five years on a global scale are provided in the following “quotable quotes”.

Climate Change/Global Warming

“Climate change... effects now being felt; developing country fossil fuels use rising with growth of many Asian and other developing countries.”

– **Name withheld** (Canada)

“Climate change and the international machinery to cope with it.”

– **Runnalls** ■ International Institute for Sustainable Development (Canada)

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4. Over Population/Development Pressure
5. Environment and Public Health

Just under three quarters of the 108 individuals who responded to the survey indicated that climate change will be one of the most important environmental issues on a global scale in the next five years. Water related issues, mentioned by over half of the survey respondents, was the next most frequent response. Slightly over a quarter of the respondents identified biodiversity as an important global issue in the next five years. Over population/development pressure and issues related to the environment and public health were mentioned fourth and fifth most frequently, by approximately an eighth of the respondents.

Question 1.3

In the next five years, in your professional opinion, what will be the three top agenda items for international environmental negotiations?

The five responses cited most frequently by survey respondents when asked their opinion about the top three agenda items for international environmental negotiations in the next five years, in order of frequency of response, were:

1. Climate Change
2. Water Related Issues
3. Trade and the Environment
4. Air Quality
5. Biodiversity

Of the 108 individuals who responded, slightly over three quarters identified climate change as one of the top three agenda items for international environmental negotiations in the next five years. The second most frequent response was water related issues, mentioned

Question 1.2 (continued)

“Climate Change: set up of institutional arrangements for emissions trading, CDM, JI and reviews of individual parties’ implementation.”

– **Kajihara** ■ Japan Environmental Agency (Japan)

“Climate Change... with the failure of Kyoto alternative means of dealing with the issue perhaps in the form of international air quality measures will be brought to the fore.”

– **Weibe** ■ Asia Pacific Foundation of Canada (Canada)

Water Issues

“Water... decreasing supply; increasing demand. Conflicts between countries and other jurisdictions over how shared water resources are used/exploited.”

– **Name withheld** (Switzerland)

“Water shortages or stress especially in developing countries.”

– **Kawashima** ■ National Institute for Environmental Studies (Japan)

“Water issues/shortages; water as a trade commodity; water pollution from development and intensive agriculture.”

– **Glover** ■ B.C. Agricultural Land Commission (Canada)

“Water... in several regions because of interrelated factors (e.g. over consumption, climate change, etc.) there will be a lack; in other areas, heavy contamination.”

– **Name withheld** (Canada)

Biodiversity

“Loss of critical wildlife habitat and ecological integrity.”

– **Name withheld** (Canada)

“Loss of forest; desertification; loss of water recharge areas; lowering of water tables leading to reduced food and fiber production.”

– **Name withheld** (USA)

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by just under half of the respondents. Just under a quarter of the survey respondents suggested that issues related to trade and the environment will be a top agenda item for international environmental negotiations in the next five years. Air quality and biodiversity were cited by just under an eighth of the respondents, fourth and fifth most frequently.

Question 1.4

In the next five years, in your professional opinion, what do you believe will be the three most important air issues in your country or jurisdiction?

When asked about the three most important air issues in their country or jurisdiction in the next five years, the survey respondents' five most frequently mentioned responses, in order of frequency of response, were:

1. Climate Change
2. Urban Air Quality
3. Airborne Toxins/Contaminates/Particulates
4. Transboundary Air Pollution
5. Transportation Related Air Pollution

Half of the 108 respondents suggested that climate change will be one of the most important air issues in their country or jurisdiction in the next half years. Issues related to urban air quality/smog were the second most frequent response, mentioned by just under half of the survey respondents. Responses related to airborne toxins/contaminates/particulates, were identified as important air issues in the next five years third most frequently, by just under a quarter of the respondents. Next in order of frequency of response were transboundary pollution, mentioned by an eighth of the respondents, and transportation related air pollution, mentioned by just under an eighth.

Question 1.2 (continued)

“Reduction of forest cover and habitat threatening greater species extinction.”

– **Name withheld** (Canada)

“Habitat destruction, especially for endangered species and third world peoples.”

– **Lawless** ■ Midwest Research Institute (USA)

Question 1.3

Examples of the range of responses for the three most frequently mentioned agenda items for international negotiations in the next five years are provided in the following sample of “quotable quotes”.

Climate Change

“Reductions of carbon Dioxide emissions to address global warming concerns.”

– **Barauskas** ■ Ontario Ministry of Natural Resources, Policy and Planning and Coordination Branch (Canada)

“Climate change... reduction on our reliance on fossil fuels and use of alternative measures.”

– **Name withheld** (Canada)

“Development of a replacement for Kyoto Protocol.”

– **Runnalls** ■ International Institute for Sustainable Development (Canada)

“Climate change, greenhouse gas emissions reduction and forest sinks.”

– **Name withheld** (Canada)

Water Issues

“Conflicts over water exploitation.”

– **Name withheld** (Switzerland)

“Interaction issues regarding cross-border water.”

– **Bouckhout** ■ E2 Environmental Alliance Inc. (Canada)

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Question 1.3 (continued)

“Water quality issues for fresh and salt water; agreements to protect over-fishing; pollution; oil and gas exploration.”

–**Glover** ■ BC Agricultural Land Commission (Canada)

“Water and economic development – pollution, sanitation, safe drinking water.”

–**Robarts** ■ GEMS/Water Collaborating Centre (Canada)

Environment and Trade:

“Connecting trade and environment in meaningful ways so that trade that is antagonistic to environmental quality and sustainable development is discouraged or prevented.”

–**Healey** ■ University of British Columbia Westwater Research Centre (Canada)

“Integrating environmental and social considerations is trade agreements.”

–**Abaza** ■ United Nations Environmental Programme (UNEP) (Switzerland)

“Trade – as bilateral and regional trade agreements gather steam (as well as WTO), increasing focus on how environmental factors will be incorporated.”

–**Wiebe** ■ Asia Pacific Foundation of Canada (Canada)

Question 1.4

Representative examples of the range of responses for the three most frequently mentioned environmental issues of importance in the next five years on a global scale are provided in the following “quotable quotes”.

Question 1.4 (continued)

Climate Change

“Greenhouse gas emissions – dealing with the consequences of climate change... potential climatic impacts on agriculture, forestry, and ranching.”

–**Prince** ■ Canadian Energy Research Institute (Canada)

“Climate change... must be integrated into the traditional air quality management system.”

–**Name withheld** (USA)

“Emissions will rise as economy expands and oil and gas industry responds to US energy agenda; this is set against likely international constraints on emissions.”

–**Name withheld** (Canada)

“Green house gas emission & legislation vs. self regulation... If we are to live up to our Kyoto commitments, then we have a lot of work to do. The government will legislate if industry doesn't self regulate.”

–**Macnamara** ■ The Banff Centre for Management (Canada)

Urban Air Quality

“Large populations in urban centres and high rate of growth has led and will continue to lead to air quality deterioration from vehicular, residential and industrial emissions. An aging population may be more susceptible to health problems from poor air quality.”

–**Name withheld** (Canada)

“Urban smog in the Greater Toronto area... it is easily identified in the day to day lives of urban dweller and it stands as a proxy for a broad sense of deterioration in environmental quality generally.”

–**Name withheld** (Canada)

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Question 1.4 (continued)

“Low level ozone and smog... trends are worsening and significant public health costs are evident; damage to property and aesthetic; crop damage, etc.”

–**Healey** ■ University of British Columbia, Westwater Institute (Canada)

“Regional photochemical smog... rapid economic growth in southern China now causing high ozone levels and reduced visibility across whole region.”

–**Law** ■ Hong Kong Environmental Protection Department (Hong Kong)

Airborne Toxins/Contaminates/Particulates

“More attention to smaller particulates and expanded list of pollutants... Increases in asthma and other respiratory problems; damage to forests and increase in smog levels in national parks and forests, particularly in Eastern mountain areas.”

–**Name withheld** (USA)

Question 1.4 (continued)

“Contaminates in the air affecting the food supply for those living in the north... The high cost of food flown into the North and the lack of ability to have subsistence food gathering due to high levels of contaminants such as PCB's will strain the social fabric of the Northern peoples.”

–**Name withheld** (Canada)

“Fine particulate air pollution... Fine particulates have been correlated with increased mortality. However, our understanding of the mechanisms of the health effects is poor. We will continue to learn a lot over the next 5 years. Someday we may find ourselves not regulating fine particle mass, but the chemical constituents of the fine particles.”

–**Name withheld** (USA)

Question 2.1

Please rate the significance of the following issues in public policy debate in your country or jurisdiction, comparing their current status with your estimates of their significance in five years. Please rate each issues on a scale of 1 to 10, where 1 is not at all significant and 10 is extremely significant.

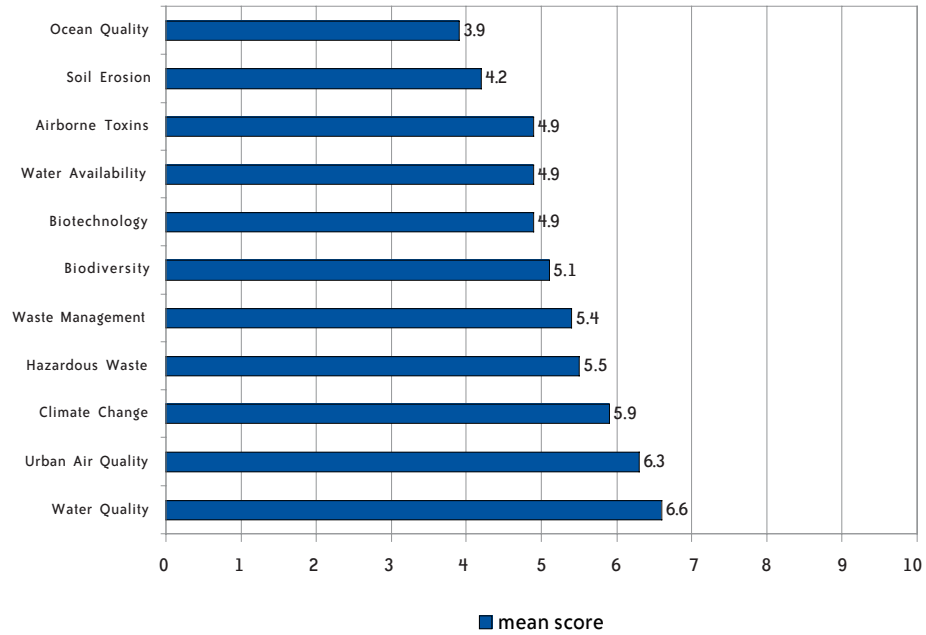
As graph 1.0 (next page) demonstrates, water quality was ranked as the most significant current environmental issue with regard to public policy debate with a mean score of 6.6 out of 10. This was followed by urban air quality and climate change. The relatively low mean score of most of the issues (mean scores that are less than 6.0) insinuates that most of these issues are not relatively significant in the current public policy debate. This does not mean these issues are not significant in

general, just that they are currently not significant in the public policy debate.

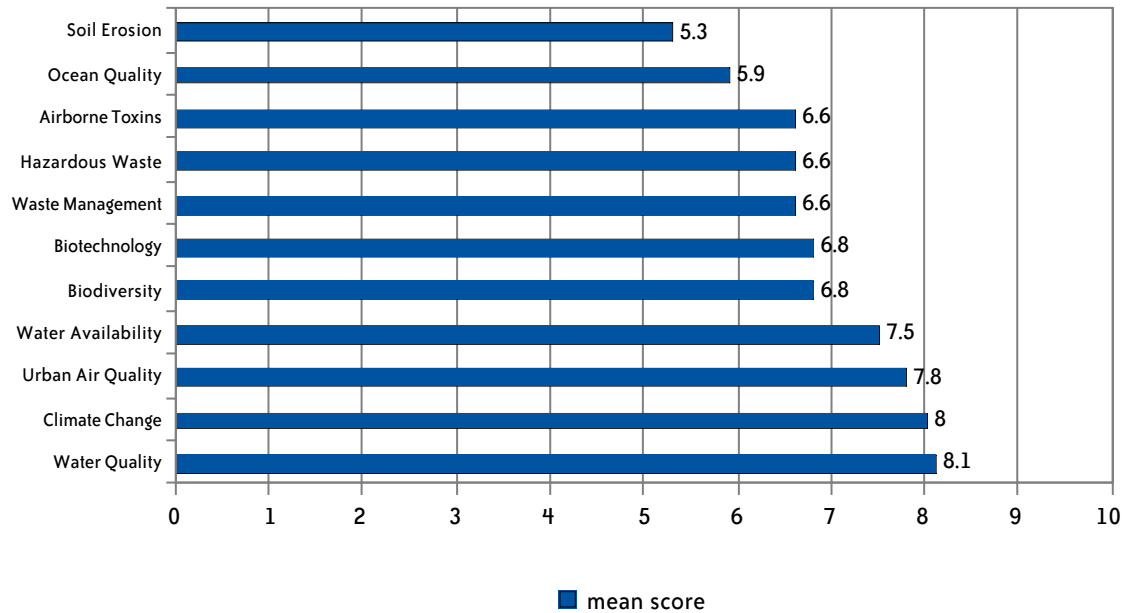
As graph 2.0 (next page) illustrates, five years from now the top three significant environmental issues in public policy debate will be water quality, climate change, and urban air quality, as identified by the participants. Although number 2 and 3 are reversed, these are the same top 3 issues that were indicated as currently being the most significant. It is interesting to note that in general participants believed the significance of these issues will increase over time (the mean scores are higher overall for the future significances). Only two of the future issues had a mean score of less than 6.0 as compared to nine of the current issues.

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Graph 1.0
Current Significance of Environmental Issues



Graph 2.0
Future Significance of Environmental Issues (5 years from now)



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The biggest differences in the ranking of current and future significances were:

- water availability, which was 8th in current significance and 4th in future significance,
- hazardous waste, which was 4th in current significance and 8th in future significance,
- waste management, which was 5th in current significance and 7th in future significance.

When you look at the actual mean scores, the biggest differences between current and future significances were:

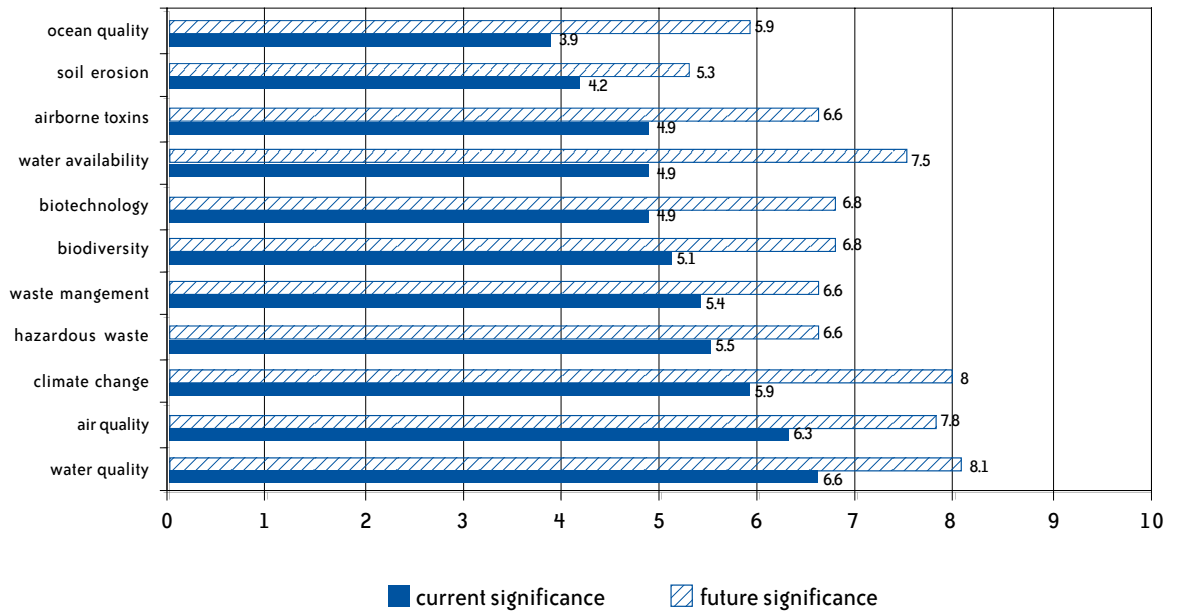
- water availability with a difference 2.6,
- climate change with a difference of 2.1, and
- ocean quality with a difference of 2.0.

Graph 3.0 (below) demonstrates the differences between the current and future significance of the environmental issues in question.

Graph 3.0

Comparison of Current and Future Significances

In order from most significant current issue to least significant current issue



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The total sample size was 108 participants. Of this 75% were Canadian, 18% were American, and 7% were from other countries. Tables 1.0 and 2.0 (below) illustrate how the various participants ranked the significance of environmental issues in the current and future public policy debate. These results should be interpreted cautiously due to the small number of responses. The “*” indicates countries that had fewer than 10 respondents.

With regard to the current policy debate, Canadians believed that water quality, urban air quality, and climate change were the most significant issues. Americans believed urban

air quality, hazardous waste, and climate change were the most significant in the current policy debate. The Americans did not have an issue with a mean score 6.0 or higher while Canadians had 2 issues over 6.0 (water quality and urban air quality). The international respondents identified urban air quality, waste management, and climate change as their most significant issues in the current policy debate. They had 5 issues with a mean score of 6.0 or higher. Urban air quality and climate change were identified by all three groups as significant current environmental issues in public policy debate.

Table 1.0
Current Significance of Environmental Issues by Country Origin

Country	urban air quality	climate change	airborne toxins	biodiversity	biotechnology	hazardous waste	ocean quality	soil erosion	water availability	water quality	waste management
All Participants	2	3	9	6	7	4	11	10	8	1	5
Canada	2	3	7	6	8	5	11	10	9	1	4
USA	1	3	9	8	7	2	11	10	4	5	6
International *	1	3	8	7	10	5	9	11	6	4	2

Table 2.0
Future Significance of Environmental Issues by Country Origin

Country	urban air quality	climate change	airborne toxins	biodiversity	biotechnology	hazardous waste	ocean quality	soil erosion	water availability	water quality	waste management
All Participants	3	2	9	5	6	8	10	11	4	1	7
Canada	3	2	5	6	7	8	10	11	4	1	9
USA	3	1	9	6	5	7	10	11	2	4	8
International *	3	2	8	5	10	4	11	9	7	6	1

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Canadians indicated that water quality, climate change, and urban air quality would be the most significant in future policy debate, while Americans chose climate change, water availability, and biotechnology. The international participants believed that waste management, climate change, and urban air quality would be the future issues of policy debate. Climate change and urban air quality were identified by all three groups as two of the top three future environmental issues in the public policy debate.

If respondents indicated any marked differences between the current and future significance of these environmental issues in public policy debate, they were asked to explain why. The common theme in these responses was around awareness. There was a general feeling that the public is unaware of the seriousness of some of these issues. Once events like Walkerton and policies like the Kyoto agreement become more prevalent, the respondents believed the public would better understand the consequences of what civilization is doing to the environment. Once the public is aware of the issues, they will pressure the government into action, hence some of the issues will become more significant in the future.

Question 3.1

In the next five years, what should be the top three priorities for scientific research related to the environment and why?

The five most frequently mentioned responses for the top three priorities in scientific research in the next five years, in order of frequency of response, were:

1. Climate Change
2. Water Related Issues
3. Ecosystem Management
4. Energy Related Issues
5. Air Quality
5. Biodiversity

Slightly more than one third of the 108 individuals who responded to the survey indicated that climate change should be one of the top priorities for scientific research in the next five years. Water related issues were named second most frequently, with one third of the respondents indicating they should be a priority in future scientific research. Just under a quarter of the survey participants suggested that ecosystem management should be a research priority in the next five years. Energy related issues were mentioned fourth most frequently by between a quarter and an eighth of the respondents, followed by air quality and biodiversity which were both identified by slightly more than an eighth of the respondents.

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Question 3.1

Examples of the range of responses related the respondents' opinions about what the top three scientific research priorities related to the environment in the next 5 years should be are provided in the following sample of "quotable quotes".

Climate change

"Impacts of climate change. This is a subject that needs better knowledge base in order to take the appropriate policy measures which will likely need to be quite strong."

–Name withheld (Switzerland)

"Vulnerability to climate change... poor understanding of the interaction among social, economic and biophysical factors that determine vulnerability. Understanding is critical to developing effective responses."

–Name withheld (USA)

Question 3.1 (continued)

"Global warming... needs to clarify the debate and identify practical initiatives."

–Law ■ Hong Kong Environmental Protection Department (Hong Kong)

"Greenhouse gas emissions and their implications for climate change ... need to understand relationship as much as possible."

–Name withheld (Canada)

Water Issues

"Applied research on cost-effective water and waste water treatment technology... Municipal capacity is limited, but science is expanding the parameters that must be addressed. Governments need ways to do this cost-effectively".

–Name withheld (Canada)

"Risks associated with use of treated water mixed with drinking water... pressure on water supplies will force consideration of reuse of treated water mixed with fresh water supplies."

–Creighton ■ Creighton and Creighton Inc. (USA)

Question 3.1 (continued)

"Water quality... We have decreasing quality in almost all jurisdictions, and we have to develop more rapid forms of detection and better forms of both long-term and crisis detoxification. Water quality will also be the proximate issue for determining the appropriate balance between public and private actions, and between demand and market approaches."

–Brooks ■ Programs Branch, International Development Research Centre (Canada)

Ecosystem Management

"Ecosystem integrity... Human impacts on ecosystems are not understood adequately. With growing populations, urban sprawl and greenfield industrial exploration and development, we risk potential irreparable damage to ecosystem structure and function, about which we know very little".

–Barauskas ■ Ontario Ministry of Natural Resources, Policy and Planning Coordination Branch (Canada)

Question 3.1 (continued)

"Ecosystem health and management... Inadequate understanding of the long term impacts of our current management practices and human activities on the entire ecosystem and its health."

–Name withheld (Canada)

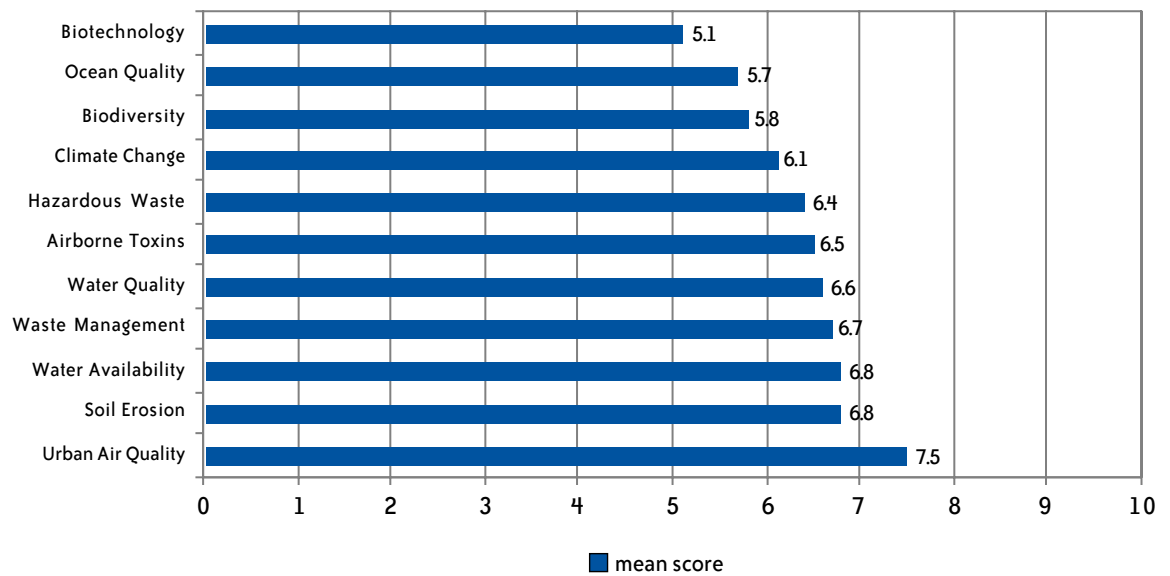
"Ecosystem function ... requires understanding of linkages."

–Runka ■ Land Sense Limited (Canada)

Survey of Emerging Environmental Issues

Graph 4.0

Credibility of Scientific Knowledge of Environmental Issues



Question 3.2

What is your assessment of the credibility of scientific knowledge within your country or jurisdiction in relation to the following environmental issues? Please rate each issue on a scale of 1 to 10, where 1 is not at all credible and 10 is extremely credible.

As graph 4.0 (above) demonstrates, urban air quality, soil erosion, and water availability are believed to have the most credible scientific knowledge while biotechnology, ocean quality, and biodiversity are perceived to have the least credible scientific knowledge.

The fact that most of the issues have mean scores over 6.0 indicates that scientific knowledge is relatively credible in these environmental areas (i.e. it is neither strong nor weak). As well, the differences between the issues are relatively small indicating there

is little variation in the credibility of scientific knowledge across the issues. It is also encouraging to see that scientific knowledge is relatively credible in urban air quality as it is also significant to the current and future policy debates.

It is interesting to note that although climate change was ranked as significant to the current and future policy debates (third and second respectively), the credibility of scientific knowledge in this area was ranked as eighth. The low ranking of ocean quality in both current and future policy debate corresponds to the low ranking of credibility this issue has in regard to scientific knowledge. Table 3.0 (next page) illustrates how each environmental issue ranked in regard to current and future policy debate and credibility of scientific knowledge.

■ Survey of Emerging Environmental Issues

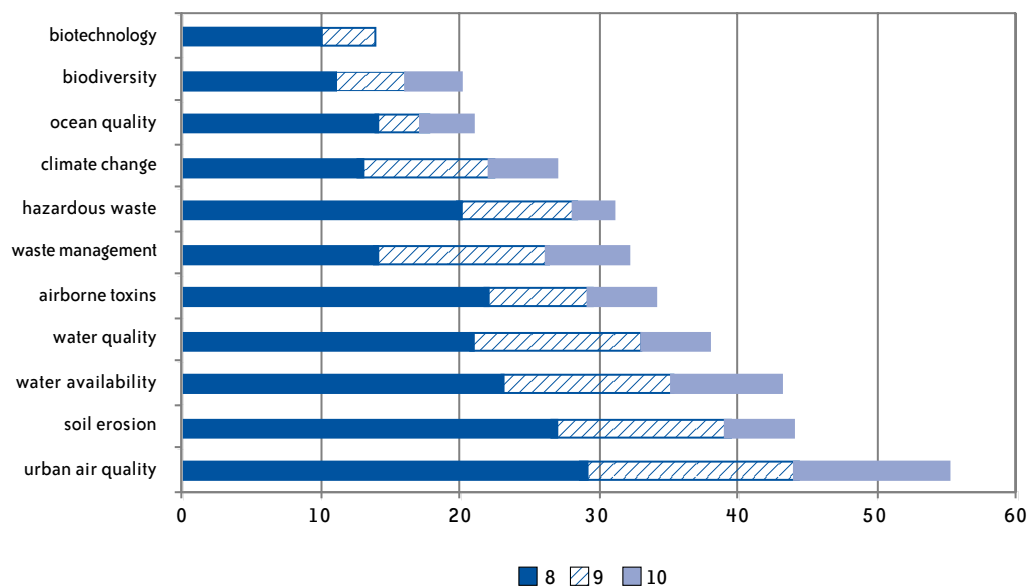
Table 3.0
Ranking of Environmental Issues in Regard to Current and Future Significance in Policy Debate and Credibility of Scientific Knowledge

All Participants	urban air quality	climate change	airborne toxins	biodiversity	biotechnology	hazardous waste	ocean quality	soil erosion	water availability	water quality	waste management
current significance	2	3	9	6	7	4	11	10	8	1	5
future significance	3	2	9	5	6	8	10	11	4	1	7
credibility	1	8	6	9	11	7	10	2	3	5	4

Another way of illustrating these results is to discuss the ‘top boxes’ or the distribution of who indicated an ‘8’, ‘9’, or ‘10’ on a 10-point scale of credibility (graph 5.0, below). This provides another way of analyzing the same information. The mean score cannot represent the distribution of the responses and hence the skew of the distribution cannot be fully appreciated.

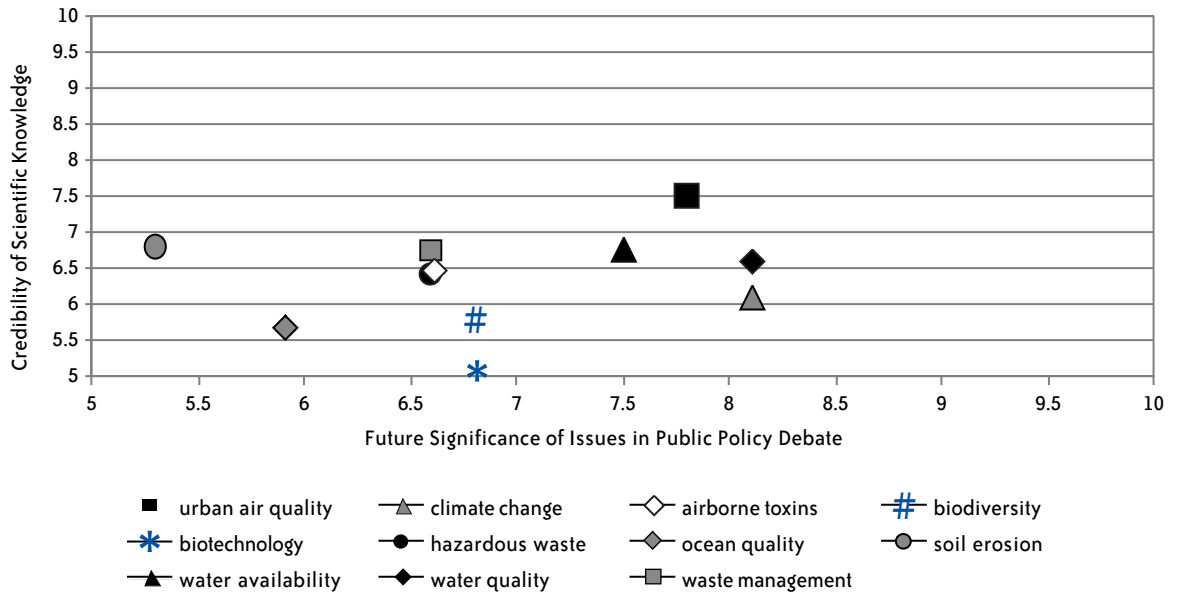
Graph 5.0 illustrates the percentage of respondents who indicated an ‘8’, ‘9’, or ‘10’ in regard to the credibility of scientific knowledge for environmental issues. This graph demonstrates how biotechnology did not receive any ‘10s’ or ‘extremely credible’ while urban air quality received the most ‘8s’ and ‘10s’.

Graph 5.0
Credibility of Scientific Knowledge of Environmental Issues



■ Survey of Emerging Environmental Issues

Graph 6.0
 Future Significance of Environmental Issues in Public Policy Debate by Credibility of Scientific Knowledge



Graph 6.0 (above) illustrates research priorities based on the current credibility of scientific knowledge in the area and the future significance of the issue in public policy debate. The placement of the two variables on a matrix suggests the likely areas in which future research activities will focus in support of policy debate. This would imply climate change and water quality, followed by water availability will be priority areas for improving scientific credibility.

Displaying data in this manner will be useful in tracking trends once several years of information are available. It should be noted these data reflect the entire sample, which is heavily weighted by Canadian EKC's.

Table 4.0 (next page) illustrates how each country ranked the credibility of scientific knowledge. As mentioned, some of the countries have few respondents in them.

All countries with 10 respondents or less are indicated with a '*'. Because of the small number of responses, this information should be interpreted with caution.

Respondents were provided the opportunity to write comments about the credibility of scientific information. There was a range in the topics discussed. Common discussions included the need for independent scientific organizations because people with vested interests conduct much of the research. As well, participants discussed the lack of adequate research. Most agreed current research is credible but indicated there is a lack of research and general information about many environmental issues. Some participants also felt the application of research is affected by political agendas.

■ Survey of Emerging Environmental Issues

Table 4.0
Credibility of Scientific Knowledge by Country

	urban air quality	climate change	airborne toxins	biodiversity	biotechnology	hazardous waste	ocean quality	soil erosion	water availability	water quality	waste management
All Participants	1	8	6	9	11	7	10	2	3	5	4
Canada	1	8	3	10	11	7	9	4	5	6	2
USA	1	7	8	11	10	5	9	4	3	2	6
International *	3	6	11	7	9	8	10	2	4	1	5

Question 4.1

In the next five years, in your opinion, what do you believe should be the focus of environmental public policy in your country or jurisdiction?

When asked about the focus of environmental public policy in their country or jurisdiction in the next five years, the survey respondents' five most frequently responses, in order of frequency of response, were:

1. Water Related Issues
2. Climate Change
3. Air Quality
4. Energy Related Issues
5. Ecosystem Management

Slightly over a third of the survey participants indicated that water related issues should be a focus for environmental public policy in their country or jurisdiction over the next five years. Climate change as a focus of future public policy, cited by just over a quarter of the respondents, was the second most frequent response. Air quality was the third most frequent response, mentioned by slightly more than an eighth of the participants. Energy related issues and ecosystem management were fourth and fifth in respective frequency, both mentioned by slightly less than an eighth of the survey respondents.

Question 4.1

Representative examples of direct “quotable quotes” for the three most frequent responses related to respondents’ opinion of the focus of public policy in their country or jurisdiction in the next five years follow:

Water Issues

“Water conservation... there will be increasing pressure to treat water as a commodity to be put into play in the market place and that is a recipe for disaster”.

–**Name withheld** (Canada)

“Water quality and quantity... public safety concerns re: drinking water; pressure on water supplies for competing uses; degradation of watersheds”.

–**Glover** ■ BC Agricultural Land Commission (Canada)

“Water allocation... shortage of water and conflict over use will mean serious discussion will need to occur about the need for environmental flows”.

–**Vanclay** ■ Centre for Rural Social Research, Charles Sturt University (Australia)

“Water quality guidelines... In light of the Walkerton water quality scandal it is clear we need to get clear public guidelines and standards in place re: water quality and human health.”

–**Name withheld** (Canada)

■ Survey of Emerging Environmental Issues

Question 4.1 (continued)

Climate Change

“Climate change... it’s a key integrator of so many other environmental problems, and it will happen with grave consequences for Canada and Canadians”.

–Name withheld (Canada)

“Motor vehicle emissions control... Polluting effects are more obvious and pronounced.”

–Name withheld (Jamaica)

“Reduced emphasis on fossil energy... to combat climate change.”

–Name withheld (USA)

“What our climate change related goals should be... In terms of protecting the climate and all that depends upon it, there is a tremendous difference between stabilizing emissions of greenhouse gases and stabilizing their concentrations. We must begin to discuss what’s the real goal and how are we going to get there.”

–Name withheld (USA)

Air Quality

“Fine particulate air pollution... the single largest air quality threat.”

–Name withheld (USA)

“Air quality – need for a national air quality strategy that includes energy use, transportation, etc... Increasing energy use, urbanization etc. is resulting in rapidly deteriorating air quality in our cities.”

–Wiebe ■ Asia Pacific Foundation of Canada (Canada)

“Mass transit to reduce urban air quality issues... improve urban air quality.”

–Name withheld (Canada)

Question 5.1

Are there environmental issues that seem small now but you think will have an impact in ten years? What are they and why will they become important?

The responses to this question were diverse and ranged from broad subject areas to very specific subject matter. In the context of a general overview, the thematic categories that were prevalent in the responses to the other survey questions (climate change, water related issues, biodiversity, biotechnology) were echoed most frequently in this question. It is interesting to note that, unlike the other open-ended questions, nuclear related issues (decommissioning, fallout, waste) were mentioned relatively frequently as environmental issues that will have an impact in ten years.

Question 5.1

Representative examples of the responses related to nuclear issues are presented in the following “quotable quotes”.

“Nuclear waste... While not a small issue now, it has laid dormant – will return as nuclear energy becomes more of a potential alternative energy source.”

–Name withheld (Canada)

“Proliferation of nuclear waste without adequate treatment or storage.”

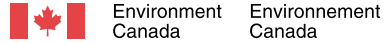
–Name withheld (Canada)

“Disposal of nuclear waste and decommissioning of nuclear reactors... they will come back on the agenda as the problem becomes urgent.”

–Name withheld (Canada)

■ Survey of Emerging Environmental Issues

Appendix I ■ Survey Instrument



■ Emerging Environmental Issues Survey

Thank you in advance for taking the time to complete this survey.

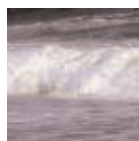
Blank answer fields are acceptable, if you do not feel comfortable commenting on the topic discussed in a particular question. We encourage you to add comments or explanations.

For further information please contact Richard Roberts, President of Praxis Inc. at 1-888-882-1285 (toll free in N. America).

Thank you for your time.

Bill Jarvis
Director General, Policy Research Directorate
Environment Canada

*Emerging
Environmental
Issues Survey*



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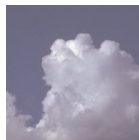
■ Survey of Emerging Environmental Issues

■ Emerging Environmental Issues Survey

Section 1: Environmental Issues

*Emerging
Environmental
Issues Survey*

1.1	In the next 5 years, in your professional opinion, what will be the three most important environmental issues in your country or jurisdiction? (Please try and identify the issue in ten words or less.)
Issue	
1.
2.
3.
1.2	In the next 5 years, in your professional opinion, what will be the three most important environmental issues on a global scale? (Please try and identify the issue in ten words or less.)
Issue	
1.
2.
3.
1.3	In the next 5 years, in your professional opinion, what will be the top three agenda items for international environmental negotiations? (Please try and identify the agenda items in ten words or less)
Issue	
1.
2.
3.



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■ Survey of Emerging Environmental Issues

■ Emerging Environmental Issues Survey

Section 1: Environmental Issues

*Emerging
Environmental
Issues Survey*

1.4 In the next 5 years, in your professional opinion, what do you believe will be the **three** most important **air issues** in your country or jurisdiction? (Please try and identify the issue in ten words or less)

	Air Issue	Why
1.		
2.		
3.		



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Survey of Emerging Environmental Issues

Emerging Environmental Issues Survey

Section 2: Environment and Public Policy Debate

*Emerging
Environmental
Issues Survey*

2.1 Please rate the significance of the following issues in *public* policy debate in your country or jurisdiction, comparing their current status with your estimate of their significance in 5 years. Please rate each issue on a scale of 1 to 10, where 1 is not at all significant and 10 is extremely significant.

Environmental Issue	Not at all significant					Extremely significant					Do not know
	1	2	3	4	5	6	7	8	9	10	
Urban Air Quality											
■ Current Significance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
■ Significance 5 years from now	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climate Change											
■ Current Significance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
■ Significance 5 years from now	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transport of Toxins (airborne)											
■ Current Significance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
■ Significance 5 years from now	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Biodiversity											
■ Current Significance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
■ Significance 5 years from now	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Biotechnology											
■ Current Significance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
■ Significance 5 years from now	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hazardous Waste											
■ Current Significance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
■ Significance 5 years from now	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oceans (water quality)											
■ Current Significance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
■ Significance 5 years from now	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Soil Erosion											
■ Current Significance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
■ Significance 5 years from now	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water Availability											
■ Current Significance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
■ Significance 5 years from now	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



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■ Survey of Emerging Environmental Issues

■ Emerging Environmental Issues Survey

Section 2: Environment and Public Policy Debate

*Emerging
Environmental
Issues Survey*

2.1 (continued)

Environmental Issue	Not at all significant					Extremely significant					Do not know
	1	2	3	4	5	6	7	8	9	10	
Water Quality											
■ Current Significance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
■ Significance 5 years from now	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Waste Management											
■ Current Significance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
■ Significance 5 years from now	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Specify)											
■ Current Significance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
■ Significance 5 years from now	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you have identified issues with marked differences in their current and future significance in public policy debate in your country or jurisdiction, please briefly indicate why.

Section 3: Scientific Research

3.1 In the next 5 years, what should be the top **three** priorities for **scientific research** related to the environment and why? (Please try to identify the issue in ten words or less.)

	Priority for Research	Reason
1.		
2.		
3.		



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■ Survey of Emerging Environmental Issues

■ Emerging Environmental Issues Survey

Section 3: Scientific Research

*Emerging
Environmental
Issues Survey*

3.2 What is your assessment of the *credibility* of scientific knowledge within your country or jurisdiction in relation to the following environmental issues? Please rate each issue on a scale of 1 to 10, where 1 is not at all credible and 10 is extremely credible.

Environmental Issue	Not at all credible							Extremely credible			Do not know
	1	2	3	4	5	6	7	8	9	10	
Urban Air Quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climate Change	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transport of Toxins (airborne)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Biodiversity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Biotechnology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hazardous Waste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oceans (water quality)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Soil Erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water Availability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water Quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Waste Management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Do you have any comments about the credibility of scientific information?



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■ **Survey of Emerging Environmental Issues**

■ **Emerging Environmental Issues Survey**

Section 4:
**Environmental
Public Policy**

*Emerging
Environmental
Issues Survey*

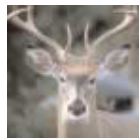
4.1 In the next 5 years, in your professional opinion, what do you believe should be the focus of **environmental public policy** in your country or jurisdiction and why? (Please try and identify the areas in ten words or less.)

	Policy Focus	Reason
1.		
2.		
3.		

Section 5:
On The Horizon

5.1 Are there environmental issues that seem small now, but you think will have an impact in 10 years? What are they and why will they become important?

	Environmental Issue	Reason
1.		
2.		
3.		



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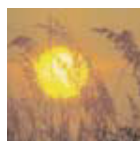
■ Survey of Emerging Environmental Issues

■ Emerging Environmental Issues Survey

**Section 6:
Respondent
Information**

*Emerging
Environmental
Issues Survey*

	Name	
	Title/Position	
	Institution	
	Address	
	Telephone	
	Fax	
	E-mail Address	
	Website	
Area(s) of expertise or Issues of interest:		
6.1	Would you like a summary of the report we will produce from this survey? Yes <input type="checkbox"/> No <input type="checkbox"/>	
6.2	Do you know of anyone else we should be including in our survey?	
	Name	
	Title/Position	
	Country	
	Telephone	
	E-mail Address	
Area(s) of specialization:		
Do you wish to remain anonymous? Yes <input type="checkbox"/> No <input type="checkbox"/>		
6.3	Do you have any comments about this survey?	



Thank You!



■ Survey of Emerging Environmental Issues

Appendix II ■ Analysis by Discipline

Each participant was asked to indicate his or her area of expertise or interest. They could identify more than one area. The following tables are divided into the various disciplines. Table 1.0 illustrates the ranking of the current significances of environmental issues in public policy debate by discipline. The top three issues for each discipline are highlighted.

It is important to note that some of the disciplines had as few as 5 people choose it as an area of expertise therefore the following data should be interpreted with caution due to the small number of responses. All disciplines with fewer than 10 participants in that category are indicated with a '*’.

Table 1.0
Current Significance of Environmental Issues by Discipline

Discipline of Respondent	urban air quality	climate change	airborne toxins	biodiversity	biotechnology	hazardous waste	ocean quality	soil erosion	water availability	water quality	waste management
All Participants	2	3	9	6	7	4	11	10	8	1	5
public process	3	2	4	7	5	6	11	10	9	1	8
fisheries	3	2	6	4	8	5	10	11	9	1	5
wildlife	3	2	7	5	8	6	10	11	9	1	4
air quality	2	3	8	7	6	5	10	11	9	1	4
parks/protected area *	3	1	6	4	9	8	5	10	11	2	7
water use & quality	2	3	7	8	6	5	11	9	10	1	4
land use & planning	3	2	6	4	7	9	11	10	8	1	5
toxics/contaminants *	2	3	4	7	8	6	9	10	11	1	5
impact assessment	3	2	9	5	8	7	11	10	4	1	6
resource economics	2	3	4	6	5	7	11	9	10	1	8
policy/legislation	3	2	8	4	7	5	10	11	9	1	6
agriculture & forestry	4	2	6	5	8	7	11	10	9	1	3
risk assessment	1	7	10	8	6	3	11	9	5	2	4
forestry *	3	5	4	2	9	7	10	11	8	1	6
energy	2	3	8	7	5	4	11	9	10	1	6

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Table 2.0 illustrates the rankings of the future significance of environmental issues in public policy debate by discipline. Again, it is important to note that some of the disciplines had as few as 5 people chose it as an area of

expertise therefore the following data should be interpreted with care. All disciplines with fewer than 10 participants in that category are indicated with a '*'.

Table 2.0
Future Significance of Environmental Issues by Discipline

Discipline of Respondent	Environmental Issue										
	urban air quality	climate change	airborne toxins	biodiversity	biotechnology	hazardous waste	ocean quality	soil erosion	water availability	water quality	waste management
All Participants	3	2	9	5	6	8	10	11	4	1	7
public process	3	2	5	6	7	8	10	11	4	1	9
fisheries	3	1	6	5	8	7	10	11	4	2	9
wildlife	3	1	6	5	7	8	11	10	4	2	9
air quality	2	1	6	7	5	8	9	11	4	3	10
parks/protected area *	3	1	10	6	4	9	7	11	5	2	8
water use & quality	3	2	8	6	4	9	10	11	5	1	7
land use & planning	4	2	7	6	5	9	10	11	3	1	8
toxics/contaminants *	1	3	4	5	8	7	6	11	10	2	9
impact assessment	4	3	7	5	6	9	10	11	2	1	8
resource economics	2	3	4	6	5	8	10	11	7	1	9
policy/legislation	3	1	7	6	5	9	10	11	4	2	8
agriculture & forestry	3	2	9	5	6	8	10	11	4	1	7
risk assessment	1	4	8	9	5	6	10	11	2	3	7
forestry *	3	4	5	2	6	8	10	11	7	1	9
energy	4	1	8	6	5	7	11	10	2	3	9

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Table 3.0
Credibility of Scientific Knowledge of Environmental Issues by Discipline

Discipline of Respondent											
	urban air quality	climate change	airborne toxins	biodiversity	biotechnology	hazardous waste	ocean quality	soil erosion	water availability	water quality	waste management
All Participants	1	8	6	9	11	7	10	2	3	5	4
public process	1	10	8	9	11	5	7	2	6	4	3
fisheries	1	9	3	10	11	8	7	2	5	6	4
wildlife	1	9	3	10	11	8	7	2	6	5	4
air quality	1	8	5	10	11	7	9	3	4	6	2
parks/protected area *	6	7	1	11	10	4	3	8	9	5	2
water use & quality	1	6	2	9	11	8	10	3	5	7	4
land use & planning	1	8	2	10	11	5	9	4	6	7	3
toxics/contaminants *	5	7	1	10	11	3	8	6	4	9	2
impact assessment	1	8	6	7	11	9	10	2	5	4	3
resource economics	1	8	6	5	11	7	4	2	10	3	9
policy/legislation	1	8	6	9	11	7	10	3	5	4	2
agriculture & forestry	1	8	2	9	11	5	10	3	4	6	7
risk assessment	1	9	2	10	11	7	8	5	6	3	4
forestry *	1	8	3	7	11	6	5	4	10	9	2
energy	1	6	9	8	10	7	11	2	3	4	5