GLOBAL CLIMATE CHANGE AS SEEN BY LATIN AMERICAN ZOO VISITORS

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GLOBAL CLIMATE CHANGE AS SEEN BY LATIN AMERICAN ZOO VISITORS

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CONTENTS

EXECUTIVE SUMMARY

Global climate change, documented to be accelerated by human activity [15], is negatively affecting the countries of Latin America [5, 9, 20, 28], a region of vast biodiversity [20, 30]. Informed decision making about personal actions related to global carbon emissions is essential in order to address this environmental issue. Psychological barriers such as ignorance, uncertainty, mistrust, denial, habit, social norms, and lack of self-efficacy, however, present challenges to engagement in climate change mitigation behaviors [1]. Additionally, perceptions of and responses to climate change differ among regions [6, 16, 27], as well as within countries (e.g. [23]). Therefore, information about a person's conceptions, attitudes, and behaviors related to climate change is essential to the development of relevant educational resources. We suggest that such resources may effectively be deployed in zoological parks, which provide practical strategies for tackling environmental conservation challenges [13], and offer visitors the opportunity to connect with animals and nature, as well as with one another.

This report presents the results of a survey of Latin American zoo visitors conducted in order to identify how this audience perceives the causes and effects of climate change, their current personal actions related to carbon emissions, and barriers to participation in mitigation efforts. In this report we begin to outline the ways in which Latin American zoos may draw upon visitors' predispositions as well as zoo resources to develop learning opportunities that inspire actions with a positive collective impact on mitigating climate change. The focus of this report is on four research questions:

1. What are Latin American zoo visitors' beliefs, attitudes, and behaviors concerning climate change?
2. What are the cognitive, emotional, and behavioral barriers to engaging in climate change action among Latin American zoo visitors?
3. Do Latin American zoos provide socially supportive and motivating contexts for discussions and responses to climate change?
4. Are Latin American zoo visitors' personal and emotional connections to animals and nature related to their disposition toward changes in behaviors that affect climate change?

The survey took place during summer 2011 at eight Latin American zoos in five countries using two independent survey forms: (a) a survey primarily focused on *attitudes* (N=1,453) and (b) a survey primarily focused on *behaviors* (N=1,493), and resulting in the following key findings:

1. *Latin American zoo visitors have a high degree of certainty that climate change is happening, human caused, and impacting them right now.*
2. *Latin American zoo visitors want to do more to address climate change and believe they can have an impact, yet perceive barriers to doing so, particularly ignorance about what behaviors will be effective.*
3. *Latin American zoos provide visitors with socially supportive contexts for discussions about animal exhibits and connections to nature.*

4. *Latin American zoo visitors' concern about climate change and participation in behaviors to address climate change systematically vary with their sense of connection with zoo animals.*

Notably, these results indicate that personal connections with animals are strongly related to Latin American zoo visitors' climate change concern, belief they can have a personal impact on addressing climate change, and their desire to do more. The zoo community, therefore, is poised on a considerable opportunity to serve as a climate change education resource for millions of zoo visitors. As suggested by our findings, this opportunity does not need to focus on increasing levels of concern and certainty about climate change. Instead, our findings indicate that this audience, already highly receptive to engagement in this pressing environmental issue, would be better served by education resources that demonstrate effective actions, create dialogue around solutions, and build optimism surrounding individuals' inclinations to be part of a collective movement to address global climate change.

RESUMEN EJECUTIVO

El cambio climático global, acelerado por las actividades humanas [15], está afectando negativamente a los países de Latinoamérica [5, 9, 20, 28], una región de vastas riquezas en biodiversidad [20, 30]. Para enfrentar este grave problema ambiental, es necesario que las acciones personales que afectan las emisiones de carbono atmosférico estén basadas en decisiones informadas. Las barreras sicológicas, como ignorancia, incertidumbre, desconfianza, negación, hábitos, normas sociales y percepciones de falta de eficacia, presentan retos a la participación en comportamientos de mitigación del cambio climático [1]. Además, las percepciones y respuestas al cambio climático varían en diferentes regiones [6, 16, 27], así como en diferentes países (por ejemplo, [23]). Es por esto que la información sobre los pensamientos, actitudes y comportamientos personales sobre el cambio climático son esenciales para el desarrollo de recursos educativos pertinentes. Sugerimos que estos recursos educativos sean presentados efectivamente en parques zoológicos, ya que los zoológicos regularmente presentan estrategias prácticas para los problemas ambientales [13]. Los zoológicos también ofrecen la oportunidad de tener conexiones emocionales con los animales y la naturaleza, así como también fomentan las conexiones familiares y sociales.

Este reportaje presenta los resultados de una encuesta de visitantes en varios zoológicos de Latinoamérica con el fin de identificar cómo el publico percibe las causas y los efectos del cambio climático, sus acciones personales actuales relacionadas con las emisiones de carbono, y las barreras que les impide participar en conductas de mitigación. En este reportaje comenzamos a delinear las maneras en que los zoológicos de Latinoamérica pueden aprovechar el conocimiento sobre las disposiciones actuales de los visitantes, así como la función del zoológico y sus recursos para desarrollar oportunidades de aprendizaje que inspiren acciones positivas sobre el cambio climático. Este reportaje investiga cuatro preguntas principales:

1. ¿Cuáles son las creencias, actitudes y comportamientos de los visitantes de los zoológicos en Latinoamérica con respecto al cambio climático?
2. ¿Cuáles son las barreras cognitivas, emotivas y el comportamiento de los visitantes de los zoológicos en Latinoamérica con respecto al cambio climático?
3. ¿Qué tipo de contexto de motivación y soporte social ofrecen los zoológicos en Latinoamérica con respecto al cambio climático?
4. ¿Existen relaciones entre las conexiones emocionales y personales de los visitantes de los zoológicos en Latinoamérica y su disposición hacia cambios de conductas que afecten el cambio climático?

La encuesta se hizo entre los meses de julio a septiembre de 2011 en ocho zoológicos en cinco países de Latinoamérica. Las instituciones que participaron fueron: Africam Safari (Puebla, México), Fundación Parque Zoológico de São Paulo (São Paulo, Brazil), Fundación Temaikèn (Escobar, Argentina), Fundación Zoológica de Cali (Cali, Colombia), Fundación Zoológica de Barranquilla (Barranquilla, Colombia), Fundación Zoológico de Santacruz (Bogotá, Colombia), Jardín Zoológico de la Ciudad de Buenos Aires (Buenos Aires, Argentina), y Zoológico de Quito en Guayllabamba (Quito, Ecuador). Se utilizaron dos formas independientes para la encuesta: la forma (a) enfocada principalmente en *actitudes* (n=1.453) y la forma (b) enfocada principalmente en *conductas* (n=1.493). Los resultados principales se resumen aquí:

1. *Los visitantes de los zoológicos en Latinoamérica tienen un alto grado de certeza que el cambio climático está ocurriendo, que es causado por acciones humanas y que los está impactando ahora mismo.*
2. *Los visitantes de los zoológicos en Latinoamérica quieren hacer más para mitigar el cambio climático y creen que pueden tener un impacto personal, pero al mismo tiempo perciben barreras, particularmente ignorancia, sobre qué conductas pueden ser efectivas.*
3. *Los zoológicos en Latinoamérica proveen ambientes sociales favorables que apoyan las discusiones sobre los animales y las conexiones con la naturaleza.*
4. *La preocupación por el cambio climático y la participación en conductas positivas para el medio ambiente están directamente relacionadas con la sensación de conexión emocional con los animales del zoológico.*

Es de notar que estos resultados indican que las conexiones emocionales y personales con los animales están fuertemente relacionadas con la preocupación sobre el cambio climático, con la creencia que pueden tener un impacto personal en mitigar el cambio climático, y con el deseo de hacer más. La comunidad de zoológicos en Latinoamérica tiene un potencial y una distinta oportunidad de servir como un recurso educativo en el cambio climático para millones de sus visitantes. Como sugieren estos resultados, ésta oportunidad no debe ser necesariamente enfocada en incrementar los niveles de preocupación o certeza sobre el cambio climático. Al contrario, nuestros resultados indican que estas audiencias ya son altamente receptivas a estos tipos de mensajes ambientales. Por lo tanto, sería un mejor servicio si los recursos educativos lograrían demostrar acciones emocionales, construyendo un diálogo sobre las conclusiones y creando optimismo sobre cómo las acciones individuales forman parte de un movimiento colectivo para enfrentar el cambio climático.

OVERVIEW

The countries of Latin America are among the most biologically diverse in the world, with 20% of plant and animal species residing in the Amazon Basin alone [20, 30]. Over the last 10 to 15 years, researchers have begun documenting the negative effects of climate change across this region, including loss of biodiversity and current and imminent stresses on agriculture, water resources, and human health [20]. For example, climate change has been related to declines in South American penguin populations due to increased frequency and severity of El Niño events, which change precipitation patterns and availability of prey fish [5, 9]. Frog and toad extinctions also have been attributed to climatic changes such as air and sea surface temperatures rise [28]. It is, furthermore, projected that climate change will contribute to significant species extinction in tropical Latin America as deforestation rates increase. While some areas of Latin America are experiencing decreased rainfall, other areas are experiencing increased precipitation, resulting in increased flooding. Decreases in glacier volume prompted by climate change have resulted in reduced access to water resources in countries such as Bolivia, Colombia, Peru, and Ecuador; and it is projected that Andean inter-tropical glaciers will completely disappear within decades [20].

There is scientific agreement that humans are the dominant cause of climate change, due to activities contributing to the emission of heat-trapping gases [15, 24]. Humans have the potential to intensify global climate change, but also to respond to it through mitigation. Dietz et al. [10] for instance, recently proposed that actions such as weatherizing and maintenance taken by individual households in the United States could reduce carbon emissions by 7.4% with almost no sacrifice. According to the American Psychological Association (APA) task force on the interface between psychology and global climate change [1], however, psychological barriers may diminish humans' participation in climate change mitigation behaviors. APA suggests that such barriers include: 1) lack of awareness about climate change and ignorance of what actions to take to address it, 2) perceptions of or actual scientific uncertainty about climate change, 3) mistrust in information about climate change or the sources of that information, 4) denial that climate change is happening or is problematic, 5) discounting the risks of climate change because it is perceived as geographically or temporally distant, 6) difficulty in changing behavioral habits, 7) concerns about perceived functional, physical, financial, social, psychological, or time-loss risks of behavior change, 8) social norms (i.e., the perceived social pressure to perform or not to perform a certain behavior), 9) conflicting goals and selecting activities that negatively impact climate change, and 10) a belief that humans can not effect climate change. Psychological barriers such as these cannot be overcome solely by providing more information about the mechanisms of the Earth's climate system and climate change education strategies cannot be developed without an understanding of how different people view its causes and impacts.

Certainly, not all persons or communities view climate change similarly or perceive the same extent of barriers to action. For example, a Pew [27] study indicated that 90% of Brazilians and 69% of Argentineans indicate that "global warming is a very serious problem," in contrast to 47% of Canadians and 44% of those in the United States. A study of levels of concern about global warming among persons in 47 countries [16] indicated that the most concerned country is Turkey and the least concerned is Zambia. Argentina and Chile ranked second and fifth most concerned, respectively, while the U.S. ranked 41st. In addition to concern, responses to climate

change also vary among regions. For instance, results from a climate change adaptation planning survey administered to ICLEI-Local Governments for Sustainability member cities worldwide indicate that relative to other regions (Africa, Asia, Australia and New Zealand, Canada, Europe, and the U.S.), a greater proportion of Latin American cities are participating in adaptation planning [6]. Additionally, Latin American and Asian cities report higher rates of partnership with NGOs for adaptation planning; and Latin America and Africa report anticipated public health impacts of climate change more so than other regions. Beyond variability by region and country, there are differences in climate change attitudes within countries, as well. For instance, a study of U.S. climate change conceptions revealed six segments of the American population, ranging from alarmed to dismissive [23].

Learning more about individuals' conceptions, attitudes, and behaviors related to climate change is essential to the development of relevant educational resources that will support participation in behaviors to address this global environmental issue. Venues well positioned to play an important role in climate change education are informal science education institutions such as zoos due to the fact a great proportion of science learning takes place outside of the formal classroom setting [12] and that such institutions have a tremendous reach to public audiences. The Latin American Zoo and Aquarium Association (ALPZA), for example, is comprised of over 50 organizations [17], and the Association of Zoos and Aquariums (AZA) has over 220 accredited member institutions [2]. Worldwide, zoos reach over 700 million visitors annually [14]. Zoo visits have been demonstrated to strengthen visitors' connections to nature, reinforce visitors' conservation outlook, and increase visitors' sense that they can be a part of the solution to environmental problems [13]. Research suggests, furthermore, that zoos can provide positive emotional contexts for visitors [25], that the zoo context supports a social identity related to concern for animals and the environment [7], that it is possible to connect emotional affinity for animals to an interest in conservation issues [8], and that emotional engagement supports learning about environmental issues [3].

Zoos have an opportunity to develop an innovative approach to climate change education– one that goes beyond didactic information delivery, leverages affective learning pathways, and encourages people to make personal connections to climate change by activating a sense of caring and concern for animals whose very existence is in question due to current changes in climate. In order to realize this potential, zoos must have a nuanced understanding of visitors' conceptions and awareness about climate change, as well as their climate change mitigation behaviors, and self-perceived barriers to take actions to address climate change.

Here we present the results of a study designed to characterize the readiness of Latin American zoo visitors to engage with the issue of global climate change. This included describing visitors' cognitive, attitudinal, and behavioral predispositions toward climate change in addition to describing their attitudes and beliefs regarding wildlife, nature, and conservation actions. In developing a guiding framework for zoo visitor surveys [19], we examined research that has explored climate change attitudes, the psychological factors related to behavior change, the cognitive and emotional impacts of zoos on their visitors, and the precursors to learning in informal environments. Thus, the following assumptions were foundational to survey development:

- Climate change attitudes and engagement vary widely across the global general public

[18, 26, 27].

- Individual actions to address climate change are heavily influenced by a range of psychological barriers, and are often triggered by emotional reactions and social norms instead of rational decisions [1].
- Zoos provide opportunities for visitors to make personal connections with animals, and these connections may facilitate a desire to engage in environmental conservation behaviors [8].
- To capitalize on the opportunities available in zoos, educational interventions must resonate with a diversity of visitors and appeal to their values. Knowing what resonates with visitors means understanding their attitudes, preconceptions, frames of reference, biases, and behaviors [4, 11].

Using this guiding framework, we developed this study to answer four research questions:

1. What are Latin American zoo visitors' beliefs, attitudes, and behaviors concerning climate change?
2. What are the cognitive, emotional, and behavioral barriers to engaging in climate change action among Latin American zoo visitors?
3. Do Latin American zoos provide socially supportive and motivating contexts for discussions and responses to climate change?
4. Are Latin American zoo visitors' personal and emotional connections to animals and nature related to their disposition toward changes in behaviors that affect climate change?

The Chicago Zoological Society, in partnership with zoos in five Latin American countries, surveyed a total of 2,946 visitors across eight Latin American zoos between June 15 and August 25, 2011 to gain much-needed information about visitors to these informal learning institutions. In order to capture the desired information on a survey of a reasonable length, two survey forms were developed: (a) a survey primarily focused on *attitudes* (N=1,453) and (b) a survey primarily focused on *behaviors* (N=1,493). The *attitudes* survey also included items from a validated segmentation procedure [21] to allow characterization of the visitors according to the "Global Warming's Six Americas" framework [18]. Since the survey items that align with this framework were developed for respondents in the United States, some modifications were made for an international audience. In particular, items that refered to the United States or the United States government were revised to say, "your country" or "your government."

Taken as a whole, the research results provide a better understanding of Latin American zoo visitors' attitudes about climate change, and offer guidance for the development of educational resources that build on visitors' values and emotional connections with animals and inspire actions that have a positive collective impact on climate change. In particular, the results reveal that:

1. *Latin American zoo visitors have a high degree of certainty that climate change is happening, human caused, and impacting them right now.*
2. *Latin American zoo visitors want to do more to address climate change and believe they can have an impact, yet perceive barriers to doing so, particularly ignorance about what behaviors will be effective.*
3. *Latin American zoos provide visitors with socially supportive contexts for discussions about animal exhibits and connections to nature.*

4. *Latin American zoo visitors' concern about climate change and participation in behaviors to address climate change systematically vary with their sense of connection with zoo animals.*

The next section of the report provides details about the survey results related to each of the four key findings. We then present the overall implications of our study. Next, we present the pertinent figures to the key findings in Appendix A and the data tables displaying the results of all the survey items appear in Appendix B. Finally, an overview of our methodology is presented in Appendix C.

KEY FINDINGS

1. Latin American zoo visitors have a high degree of certainty that climate change is happening, human caused, and impacting them right now.

One of the goals of this study was to explore Latin American zoo visitors' level of concern about global warming, their beliefs about its causes and impacts, and their level of trust in various sources of climate change information.

- Eighty-five percent of Latin American zoo visitors are *concerned* or *alarmed* about global warming and only one percent is *doubtful* (Figure A1).
- Latin American zoo visitors in the *alarmed* and *concerned* segments tend to engage in various conservation behaviors more so than other visitor segments (Figure A2).
- Greater than 90% of Latin American zoo visitors believe *global warming* or *climate change* is happening. (Figure A3).
- Eighty percent of Latin American zoo visitors believe human actions are related to global warming (Figure A4).
- Global warming is an issue that Latin American zoo visitors think and worry about (Figures A5 & A6).
- Latin American zoo visitors believe global warming is presently harming persons in their country (Figure A7).
- Latin American zoo visitors think global warming will harm them personally and will harm future generations (Figures A8 & A9).
- Latin American zoo visitors have strong agreement that climate change poses threats to wildlife, the ocean, and human health. Visitors have a stronger agreement that climate change threatens the survival of wildlife worldwide and in the arctic than they do that it threatens local wildlife or human health (Figure A10).
- In general, Latin American visitors tend to trust environmental organizations, scientists, and zoos more than other sources of information regarding climate change (Figure A11).

According to the Six Americas team [16], *alarmed* and *concerned* persons are those who are sure global warming is happening and the *alarmed* segment is highly likely to engage in personal behaviors to address it and believes its effects are happening now. Although those in the *cautious* segment have less certainty than those who are *alarmed* or *concerned* that global warming is happening, they believe that it will impact future generations. Latin American zoo visitors think and are worried about global warming. The majority of Latin American zoo visitors tend to think that global warming is presently impacting persons in their country, will cause them personal harm, and will harm future generations. These findings are consistent with research indicating high levels of concern about global warming among persons in Latin American countries. In a study of 47 countries, Argentina was found to be the second most concerned country. Mexico and Brazil were also among the top 24 concerned countries represented in the study [16]. Furthermore, Latin American Zoo visitors trust zoos (third only to environmental organizations and scientists) as sources of climate change information. These findings suggest that Latin American zoo visitors are receptive audiences for climate change education.

2. Latin American zoo visitors want to do more to address climate change and believe they can have an impact, yet perceive barriers to doing so, particularly ignorance about what behaviors will be effective.

To help inform educational strategies within zoos, some visitor survey items focused on identifying any cognitive, emotional, and behavioral barriers to engaging in climate change action.

- Forty-eight percent of Latin American zoo visitors believe they can personally have a *great deal* of impact on addressing climate change; another 32% believe they can have a *fair amount* of impact (Figure A12).

- Latin American zoo visitors perceive switching to more energy-efficient light bulbs, driving a fuel-efficient car, and talking to others as impactful behaviors in addressing climate change. However, few visitors perceive donating money, making meatless dinners, and signing petitions as having a large impact in addressing climate change (Figure A13).

- Eighty-eight percent of Latin American zoo visitors would like to do more to address climate change. Of those who want to do more, 96% identified at least one personal barrier that was standing in their way. The most prevalent self-perceived barrier to addressing climate change is not knowing what actions would be effective (Figure A14).

- Although many Latin American zoo visitors believe that humans have the capability to address global warming, a substantial proportion hold a pessimistic view of whether people in general will do what is needed. Nearly 50% of Latin American zoo visitors believe *it's unclear at this point whether we will do what is needed*; another almost 20% of visitors believe *people aren't willing to change their behavior*. However, greater than 25% hold an optimistic view and believe *humans can reduce global warming, and we are going to do so successfully* (Figure A15).

These findings suggest that zoos have an opportunity to support visitors in their desire to address climate change by providing information about effective, time-efficient, and affordable actions. Furthermore, zoos have an opportunity to draw upon their social context in order to alleviate the level of pessimism about whether or not humans will take collective action to address climate change.

3. Latin American zoos provide visitors with socially supportive contexts for discussions about animal exhibits and connections to nature.

The surveys included various questions to find out whether zoos provide visitors with socially supportive and motivating contexts for discussing and responding to climate change.

- Over 40% of Latin American zoo visitors indicated that most or all of their friends share their views on global warming. (Figure A16).
- Latin American zoo visitors overall, and particularly those who are *alarmed* or *concerned* about global warming:
  - Enjoy discussing animal exhibit signs and displays with their family or companions (Figure A17);
  - Use zoo visits as a chance to talk to companions about their relationships to nature (Figure A18);
  - Are interested in finding out more about how global warming is affecting wildlife and their natural habitats (Figure A19); and
  - View zoos as trustworthy places to find out how to help reduce the effects of global warming, more so than visitors who are *cautious*, *disengaged*, *doubtful*, or *dismissive* (Figure A20).

These findings suggest that Latin American zoos can capitalize upon their visitors' social enjoyment in conversing about exhibits and their relationships to nature as one potential vehicle for climate change education. Potential display topics include the effect of global warming on wildlife and how to help reduce the effects of global warming.

4. Latin American zoo visitors' concern about climate change and participation in behaviors to address climate change systematically vary with their sense of connection with zoo animals and nature.

The survey asked various questions about visitors' personal and emotional connections to animals to identify any relationship these connections might have to their disposition toward changes in behaviors that affect climate change.

- Eighty percent of Latin American zoo visitors report feeling a somewhat to strong sense of connection with the animals they see at a zoo (Figure A21).
- Results revealed that Latin American zoo visitors' sense of connection to animals is highly related to:
  - Perception of being able to personally address climate change (Figure A22);
  - Concern about the effects of climate change (Figure A23);
  - The extent to which visitors talk to others about the importance of addressing climate change (Figure A24); and
  - Wanting to do more to address climate change (Figure A25)
- Latin American zoo visitors' feelings of commonality with other species and spiritual connections with nature are highly related to the Six Americas segments, as is the extent to which seeing zoo animals makes them think about their concern for animals in the wild (Figures A26, A27, & A28).

Zoos have a uniquely extraordinary opportunity to connect visitors with animals. These survey findings suggest that climate change education resources within zoos can benefit from the strong connections visitors feel with the institutions' living collections. Visitors' connection with animals, sense of commonality with other species, and spiritual connection with nature can be both strengthened via zoo experiences and used as assets when developing and implementing education initiatives within zoos that aim to inspire participation in behaviors that address climate change.

IMPLICATIONS

The vast majority of Latin American zoo visitors agree that climate change is happening and believe it is caused by human actions. Moreover, most visitors are concerned about the effects of climate change, believe it is presently harming persons in their country, and want to do more to address it. Our findings indicate that even this highly motivated audience has climate change learning needs. The high level of trust Latin American zoo visitors have in zoos as sources of climate change information, along with the associations between visitors' sense of connection with animals and concern about climate change and participation in behaviors to address it, suggest the strong potential for zoos to provide relevant climate change education resources to the public.

Survey findings suggest that despite Latin American zoo visitors' awareness of climate change and motivation to take action to address it, they perceive barriers to engagement in climate change mitigation behaviors. When asked what is standing in their way of doing more to address climate change, 96% of Latin American zoo visitors reported at least one obstacle. The obstacle selected most frequently was a lack of knowledge of which actions would be effective. Pessimism about whether others will do what is necessary to address climate change is another barrier perceived by Latin American zoo visitors. Nearly 20% of Latin American zoo visitors feel that although human action can reduce the effects of climate change, people in general are not willing to change their behavior. Another 50% of visitors are uncertain as to whether or not people in general will do what is needed to address climate change. Notably, one-quarter of Latin American visitors hold the optimistic view that humans can and will successfully reduce global warming.

The development of zoo-based climate change education resources may be guided by our study findings. Zoos have an opportunity to address visitors' perceived barriers to climate change mitigation by providing learning opportunities that will aid them in making informed decisions about effective actions to address climate change. For example, the low percentages of Latin American zoo visitors selecting behaviors such as eating meatless dinners and locally grown food as having the most impact on climate change suggests there is an opportunity to provide learning resources about the environmental effects of such behaviors.

Furthermore, the zoo context can serve to ameliorate pessimism perceived by Lain American zoo visitors surrounding whether humans will do what is necessary to address climate change. Zoo education resources can demonstrate the collective impact of individual actions. Additionally, the social context within the zoo setting can be leveraged in order to reinforce individuals' inclination to address climate change and nurture collective action.

Findings about visitors' sense of connection with animals they see at the zoo suggest the strong potential for zoos to include climate change education within exhibit interpretation of the living collection. Overall, Latin American zoo visitors' sense of connection with animals is associated with overall concern about the effects of climate change, a desire to do more to address it, the extent to which they talk to others about the importance of addressing climate change, and perception that they can have a personal impact. Zoos, therefore, can build upon visitors' engagement with their collection in order to build communities with the capacity to engage in actions that will have a collective impact on addressing global climate change.

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APPENDIX A: FIGURES

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Figure A1. **Segmentation of Latin American zoo visitors and the United States national sample according to the Six Americas categories**

Eighty-five percent of Latin American zoo visitors are *concerned* or *alarmed* about global warming, and only one percent of Latin American zoo visitors are *doubtful* about global warming. Also presented here are data from a study conducted with members of the United States of America general public [18], the country in which the Six Americas segmentation originated. Thirty-nine percent of the U.S. general public is *concerned* or *alarmed* about global warming, and 15% is *doubtful* about global warming.

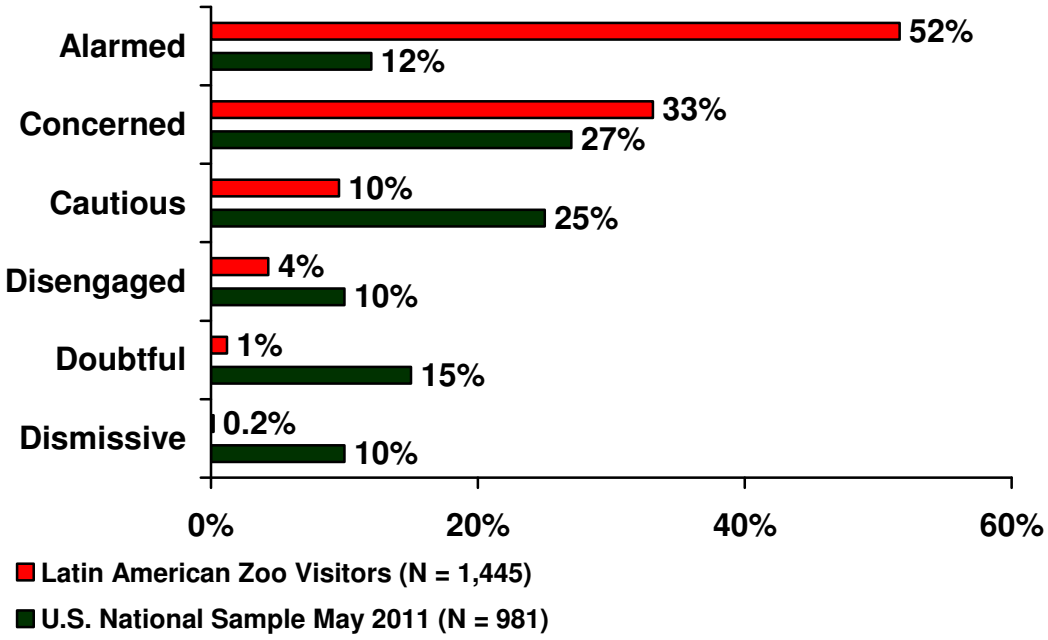


Figure A2. **Latin American zoo visitors' average ratings of the extent to which they typically engage in conservation efforts during daily activities (recycling, reducing energy usage, buying earth-friendly products, etc.)**

When asked to rate the extent to which they typically engage in conservation efforts, Latin American zoo visitors' overall average rating is 5.03. Those who are *alarmed* or *concerned* about global warming rate this item higher, on average, than those in the other five segments.

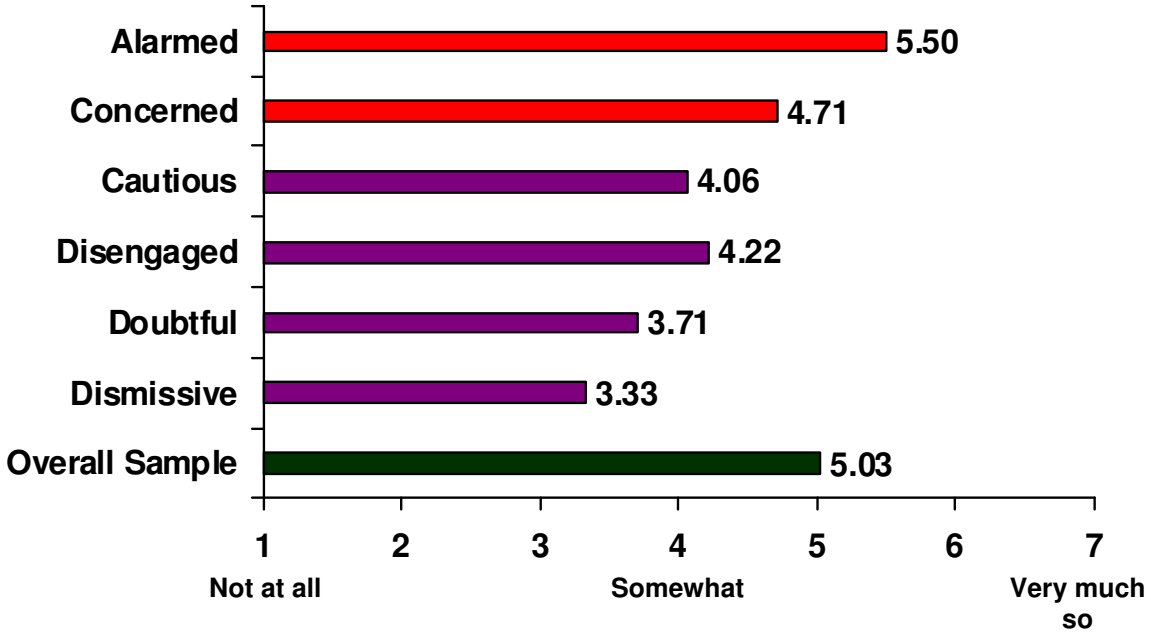


***Figure A3*. Percentages of Latin American zoo visitors who think climate change / global warming is happening**

The Six Americas team uses the term "global warming" in their national research. Our *attitudes* survey that used the Six Americas segmentation survey items, likewise, used the term "global warming" throughout the survey. Our *behaviors* survey, which did not include the Six Americas items, used the term "climate change" throughout the survey. We used the two different visitor surveys to compare responses to alternative wording of the same item: 'Do you think that [*global warming/climate change*] is happening?' Ninety-four percent of Latin American zoo visitors think *climate change* is happening. When posed with this question using the term *global warming*, 93% of Latin American zoo visitors are in agreement that it is happening. There is no statistically significant difference between these percentages, indicating there may not be a preferred term among Latin American zoo visitors.

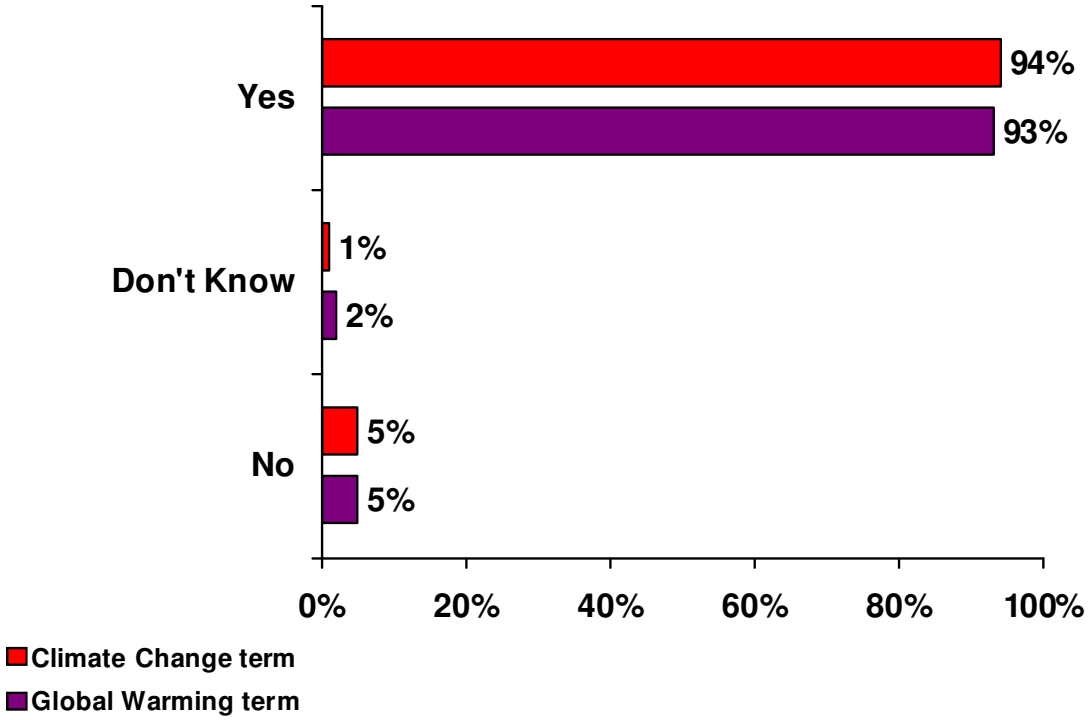


Figure A4. **Latin American zoo visitors' thoughts on the causes of global warming (assuming global warming is happening)**

Eighty percent of Latin American zoo visitors think that—assuming it is happening—global warming is caused mostly by human activities, and 17% think it is caused mostly by natural changes in the environment.

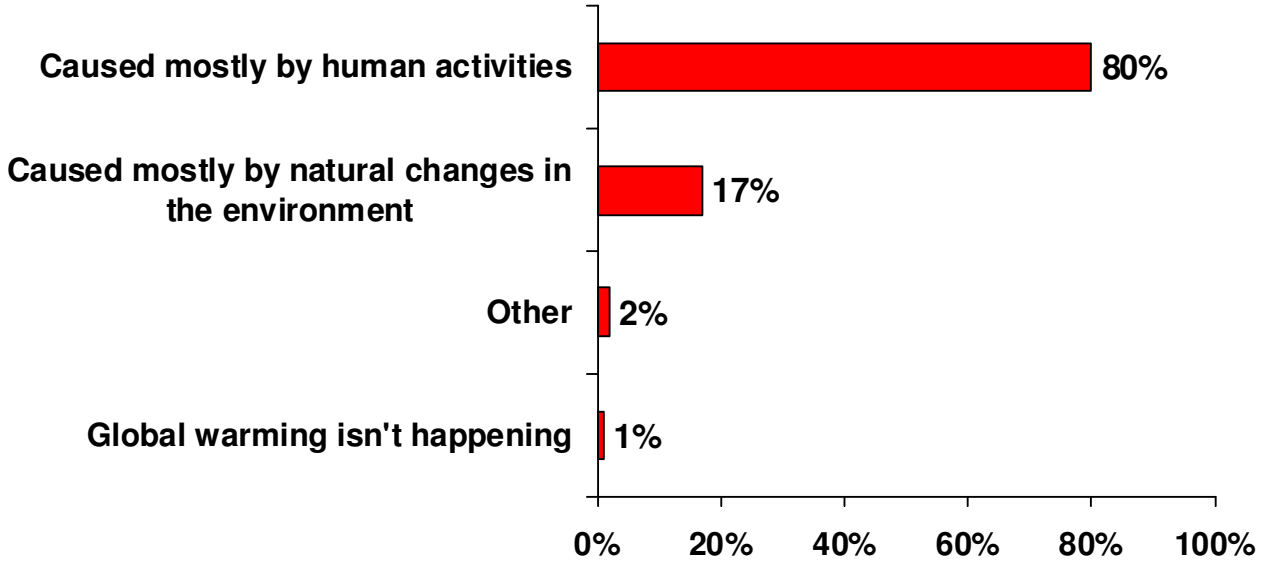


Figure A5. **The extent to which Latin American zoo visitors thought about global warming before the day they responded to the survey**

Just over 80% of Latin American zoo visitors are thinking about global warming *some* or *a lot* of the time, and only 6% are not thinking about it at all.

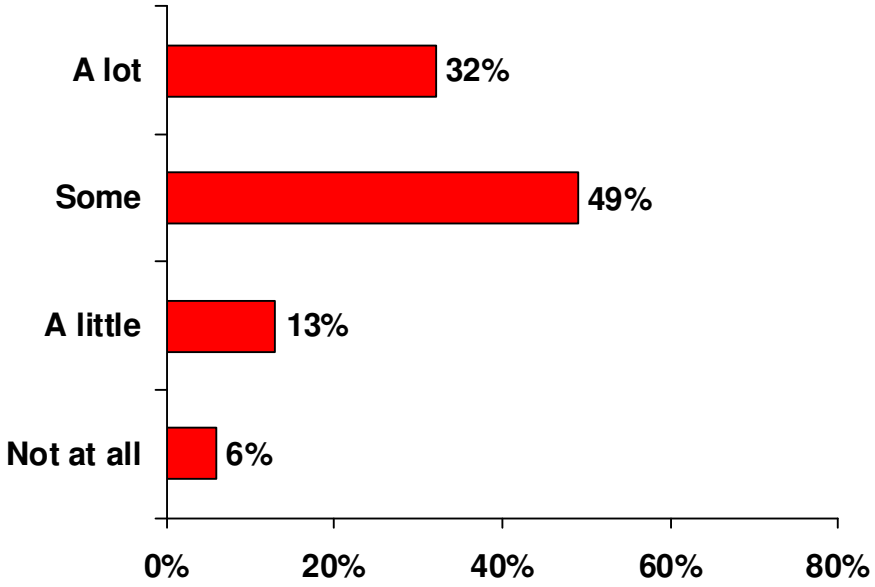


***Figure A6*. The degree to which Latin American zoo visitors are worried about global warming**

Nearly two-thirds of Latin American zoo visitors are very worried about global warming, and only 3% are not at all worried.

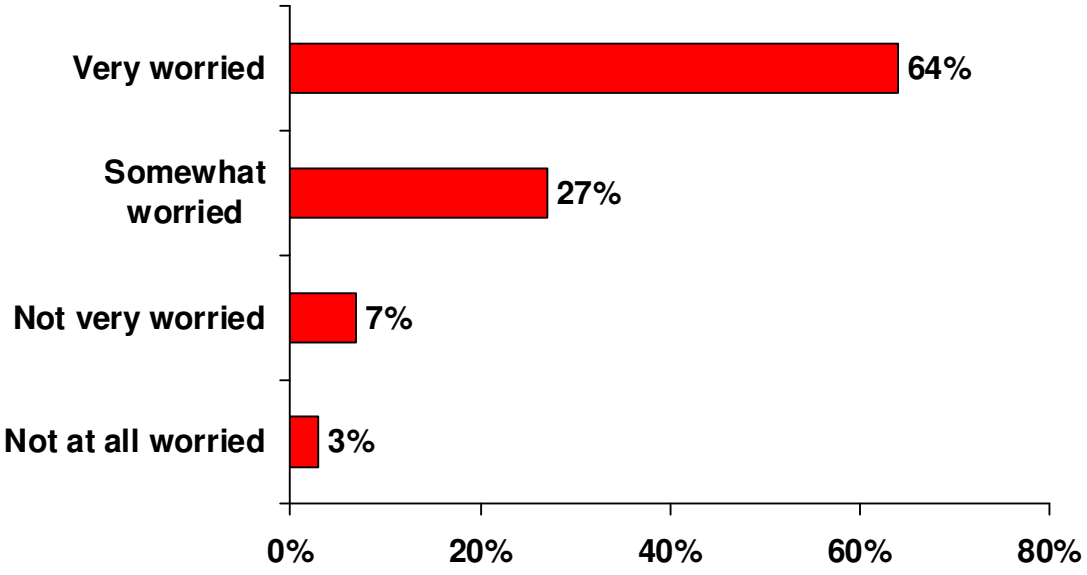


Figure A7. **The time frame within which Latin American zoo visitors think global warming will start to harm people in their country**

Just over 80% of Latin American zoo visitors think global warming is presently harming people in their country, and only 1% thinks it will never harm people.

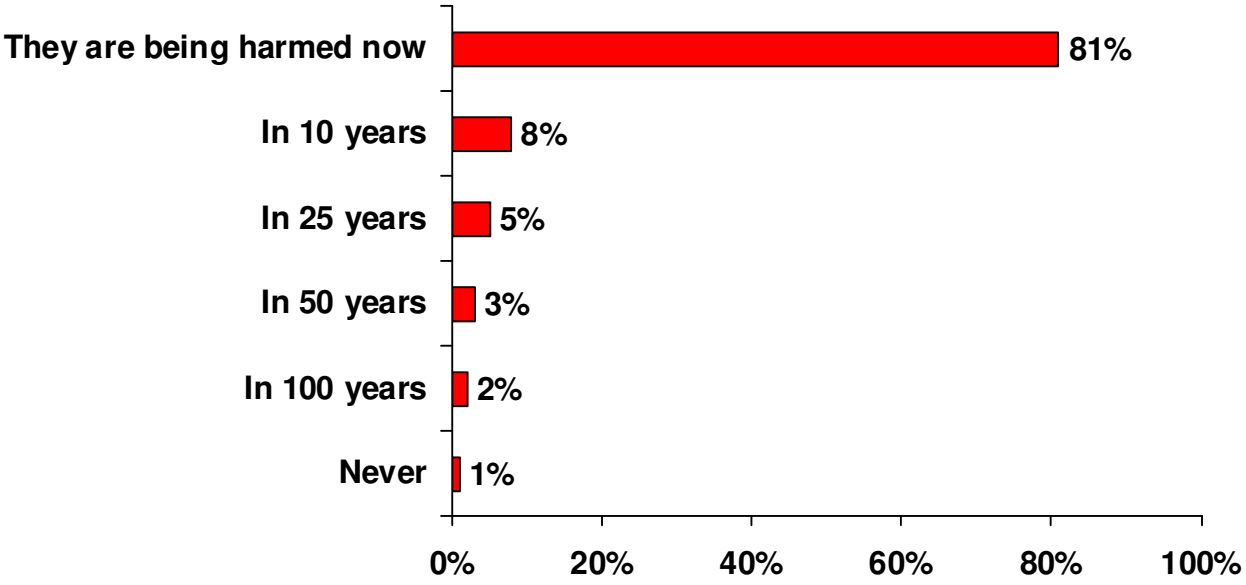


Figure A8. **The extent to which Latin American zoo visitors think global warming will harm them personally**

Eighty-five percent of Latin American zoo visitors think global warming will harm them personally, *moderately* or a *great deal,* and only 2% think it will not harm them at all.

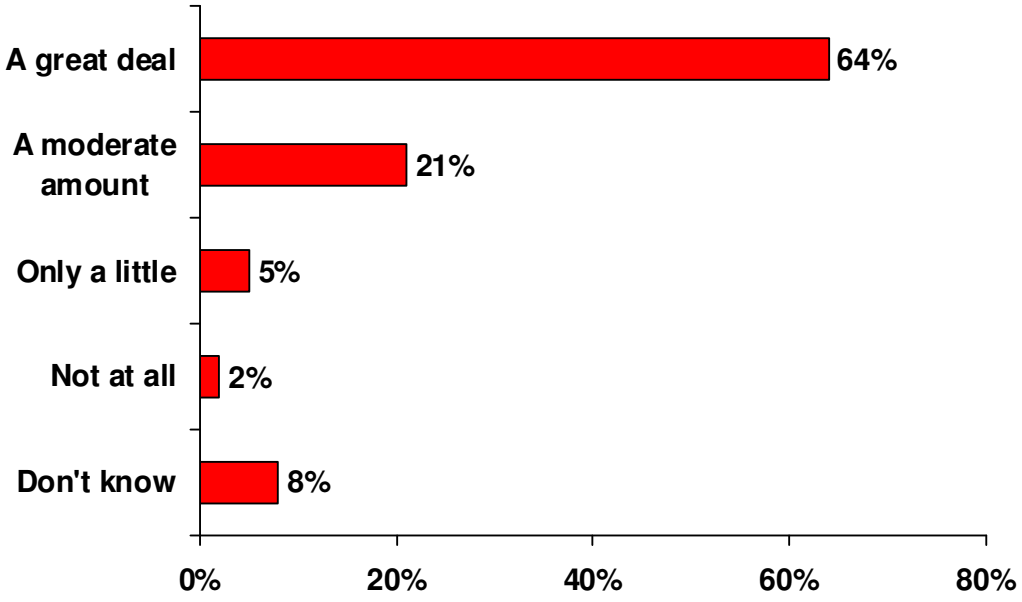


***Figure A9*. The extent to which Latin American zoo visitors think global warming will harm future generations of people**

Just over 85% of Latin American zoo visitors think global warming will harm future generations *moderately* or a *great deal*, and only one percent thinks it won't harm them at all.

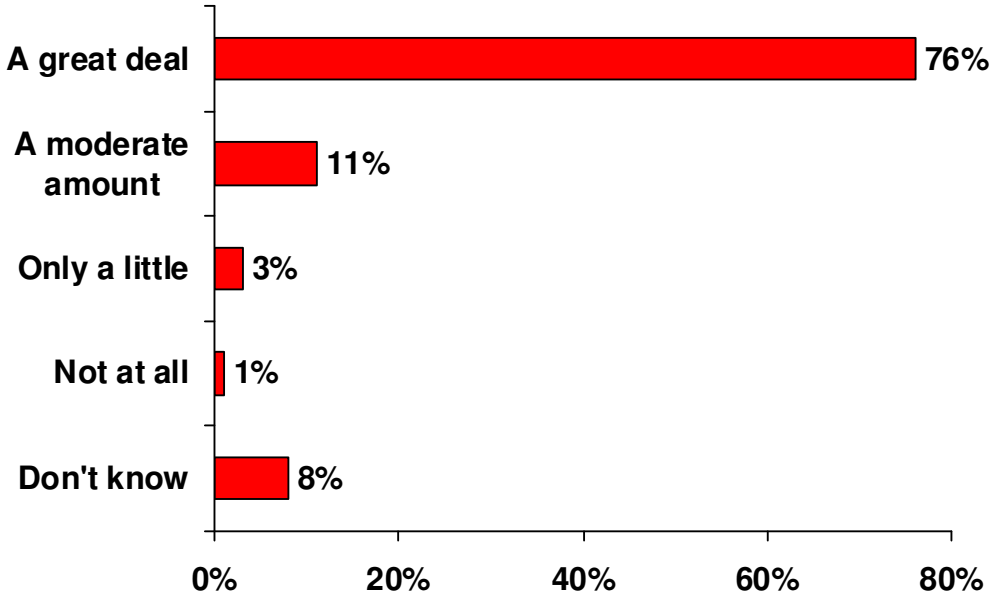


Figure A10. **Average ratings for Latin American zoo visitors' agreement with statements about climate change threats**

Overall, Latin American zoo visitors have strong agreement that climate change poses threats to wildlife, the ocean, and human health. Relative to perceptions of climate change threats to local wildlife and human health, Latin American zoo visitors assign higher ratings to perceptions of climate change as a geographically distant threat. On average, Latin American zoo visitors have a stronger agreement that climate change threatens the survival of wildlife worldwide (6.43) and arctic wildlife (6.35) than they do that it threatens local wildlife (6.12) or human health (5.81).

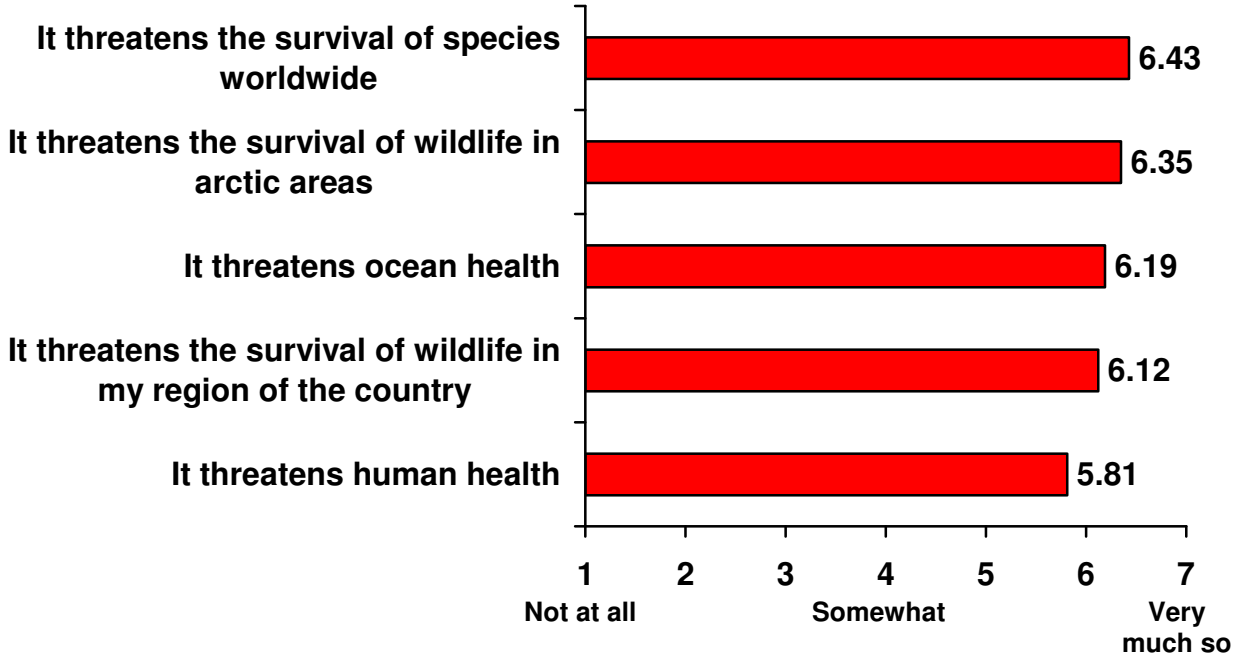


***Figure A11*. Overall average ratings of how much Latin American zoo visitors trust various sources of information about climate change**

When asked a series of questions about trusting different sources of climate change information, Latin American zoo visitors rate, on average, environmental organizations, scientists, and zoos and aquariums the highest. In contrast, government agencies were rated the lowest as a trusted source of information.

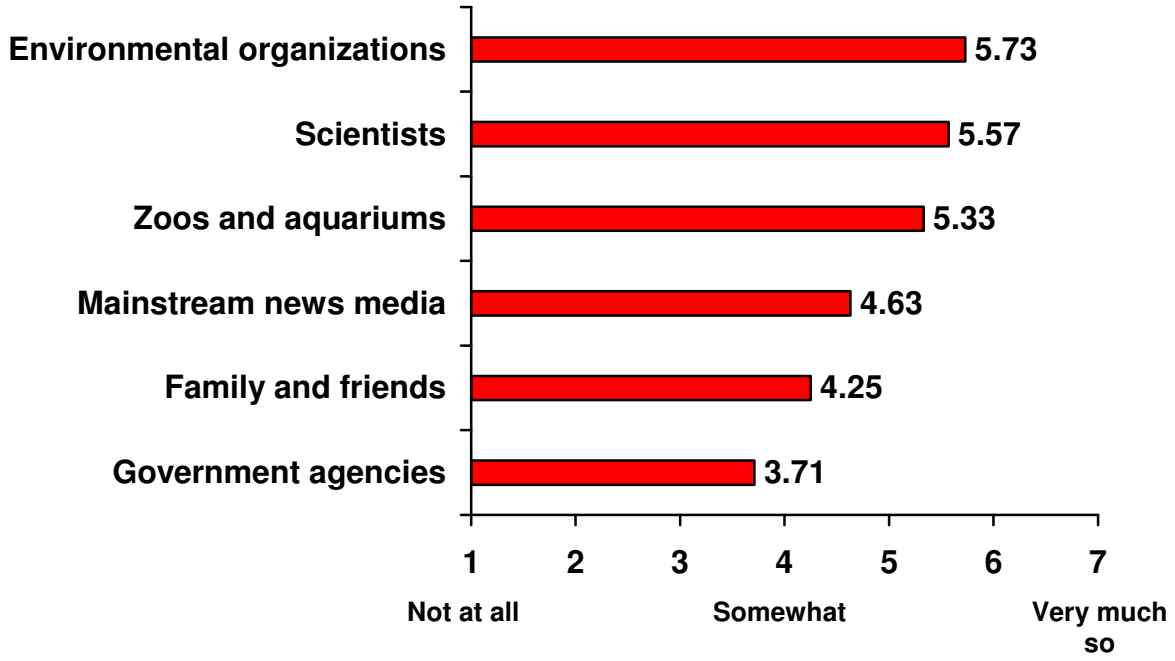


***Figure A12*. How much of an impact Latin American zoo visitors believe they can have personally on addressing climate change**

Eighty percent of Latin American zoo visitors believe they can personally have a *fair amount* or *great deal* of impact on addressing climate change.

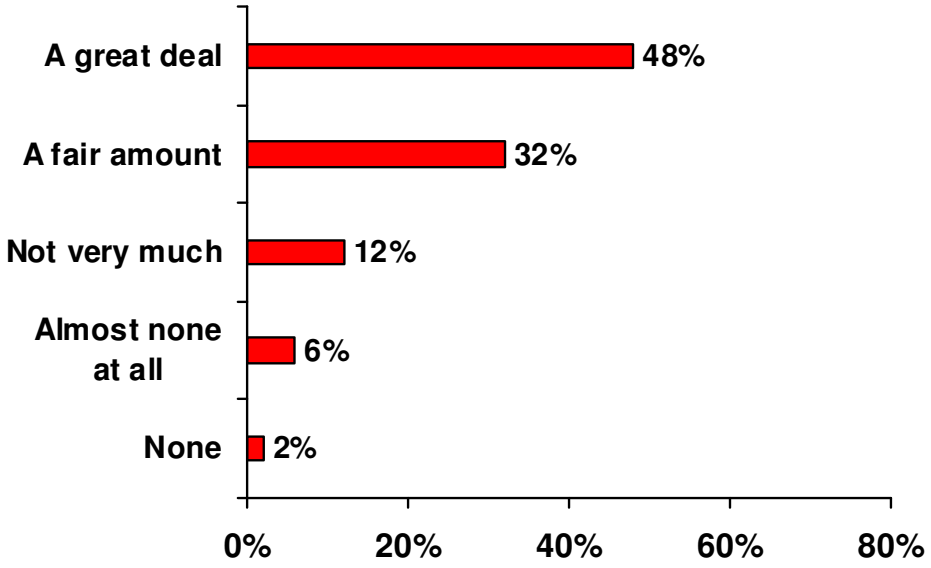


Figure A13. **Percentage of Latin American zoo visitors selecting various behaviors as having the most impact on climate change (select up to three actions)**

In addressing climate change, over one-half of Latin American zoo visitors perceive switching to more energy-efficient light bulbs as a highly impactful behavior; and over 40% view driving a fuel-efficient car as impactful. However, fewer visitors perceive donating money, making meatless dinners, and signing petitions as having a large impact on climate change.

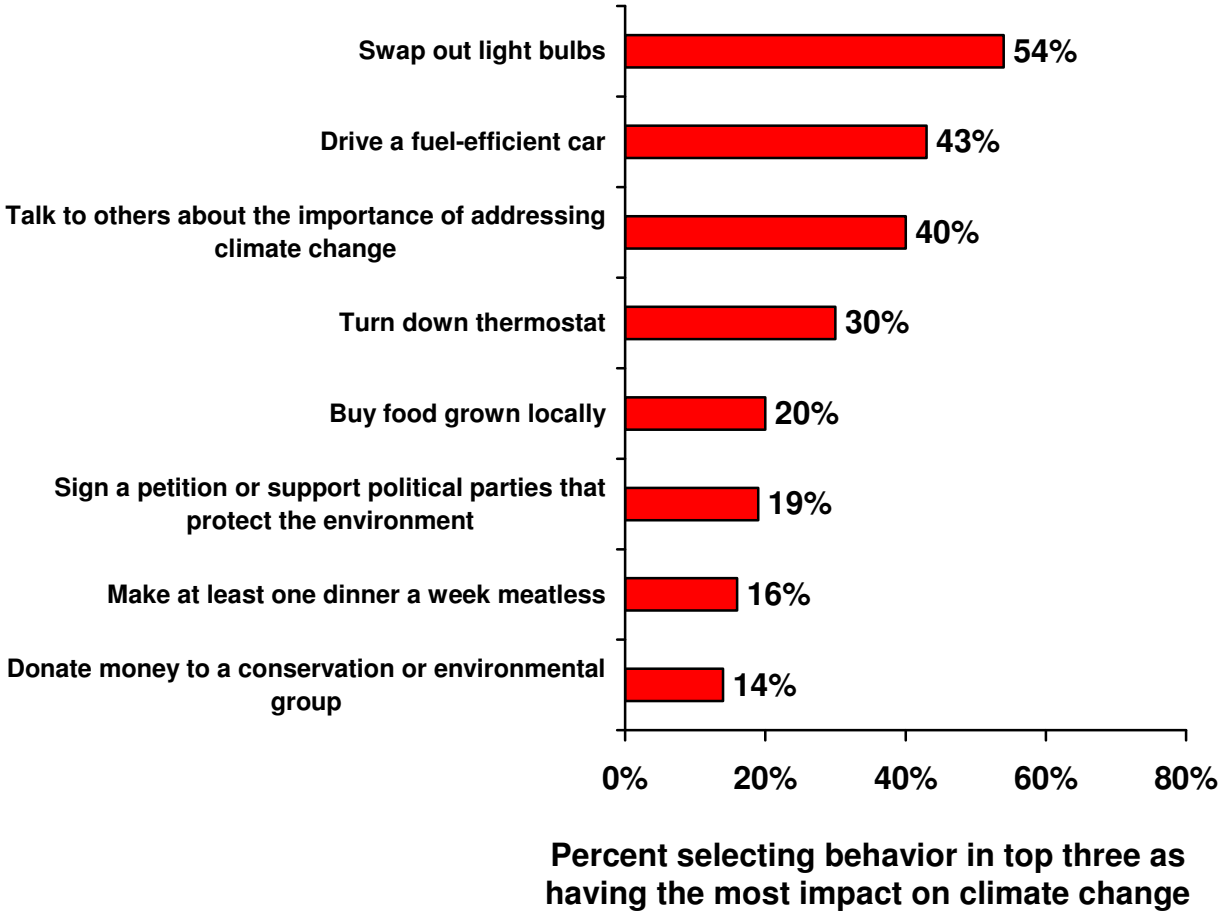


Figure A14. **Percentages of Latin American zoo visitors indicating self-perceived barriers to doing more to address climate change (select all that apply format)**

Eighty-eight percent of Latin American zoo visitors would like to do more to address climate change. Of those, respondents were asked to select which barriers (if any) were standing in their way of doing more to address climate change. Overall, 96% of respondents selected at least one barrier. "I don't know what actions would be effective" was the response selected by the largest percentage of visitors (39%). Other top selections included time (18%) and cost (17%) barriers.

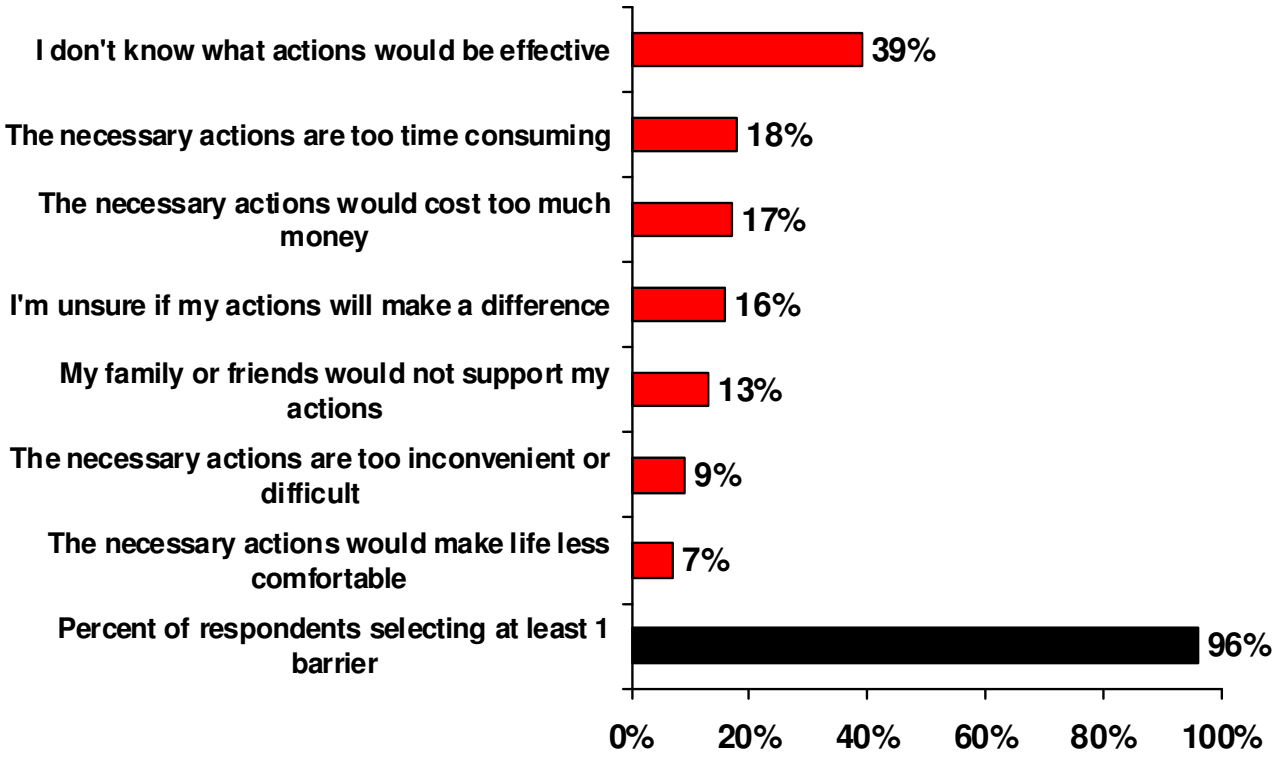


Figure A15. **Latin American zoo visitors' views on humans' efficacy and willingness to change behaviors to reduce global warming**

Concern about global warming is a persistent theme among Latin American zoo visitors. Another theme that emerged from visitors' responses is a belief that humans may not do what it takes to reduce global warming. Nearly 50% of visitors identified with the statement, "*Humans could reduce global warming, but it's unclear at this point whether we will do what is needed*" and another almost 20% of visitors selected "*Humans could reduce global warming, but people aren't willing to change their behavior, so we're not going to*" as the statement closest to their view. However, greater than 25% believe *humans can reduce global warming, and we are going to do so successfully.*

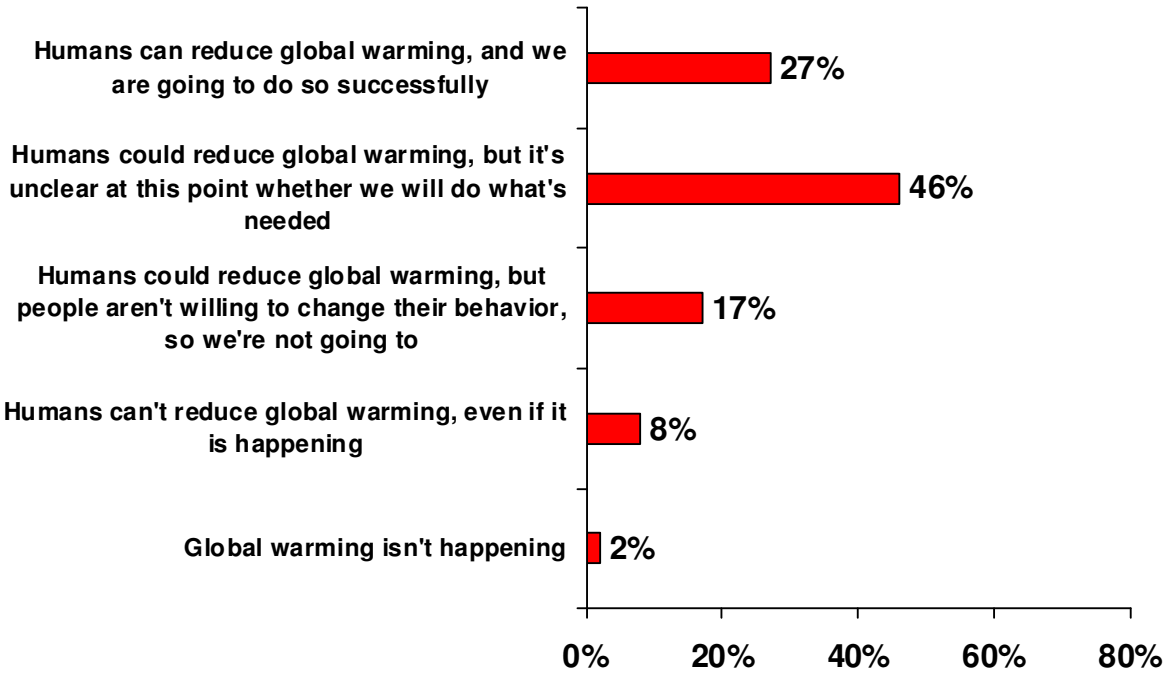


Figure A16. **Latin American zoo visitors' indication of how many of their friends share their views on global warming**

Forty-two percent of Latin American zoo visitors indicated that most or all of their friends share their views on global warming. Only four percent of Latin American zoo visitors indicated that none of their friends share their global warming views.

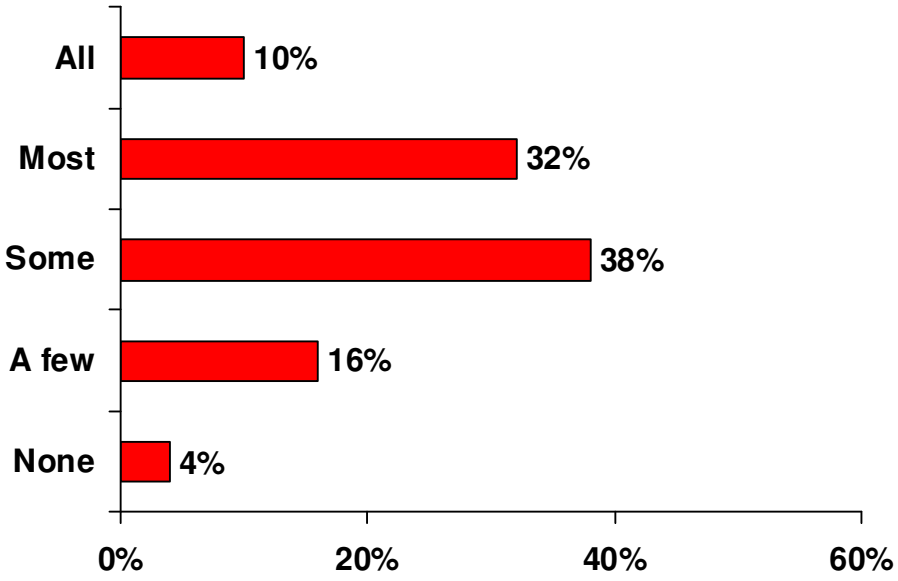


Figure A17. **Average ratings of the extent to which Latin American zoo visitors in each Six Americas segment enjoy discussing exhibit signs and displays with family/ companions**

Overall, Latin American zoo visitors enjoy discussing exhibit signs and displays with their companions (average rating 5.13). Those who are *alarmed* or *concerned* about global warming rate this item higher, on average, than the other four segments.

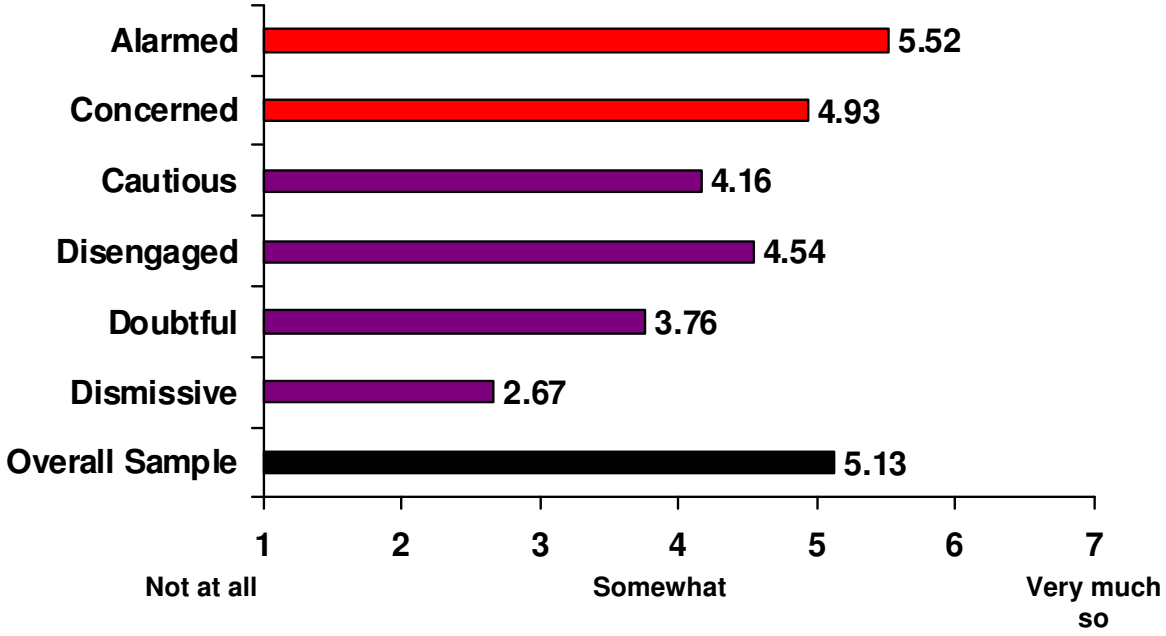


Figure A18. **Average ratings of the extent to which Latin American zoo visitors in each Six Americas segment use their visits as a chance to talk to family/ companions about their relationships to nature**

Overall, Latin American zoo visitors use their visits as a chance to talk to their companions about their relationships to nature (average rating 5.71). Those who are *alarmed* or *concerned* about global warming rate this item higher, on average, than the other four segments.

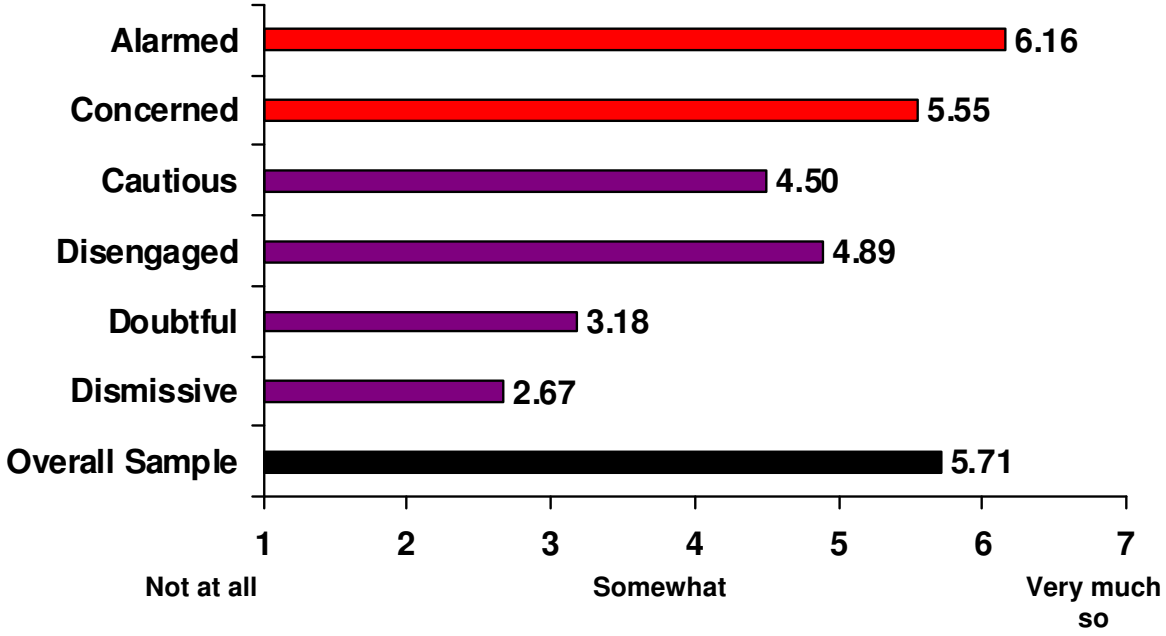


Figure A19. **Average ratings of the extent to which Latin American zoo visitors in each Six Americas segment are interested in finding out more about how global warming is affecting wildlife and natural habitats**

On average, Latin American zoo visitors who are *alarmed* about global warming are much more interested in finding out more about how global warming is affecting wildlife and their habitats than are visitors who are *doubtful.* The average interest rating among *alarmed* visitors was 6.26; the average interest rating for *doubtful* visitors was only 2.94.

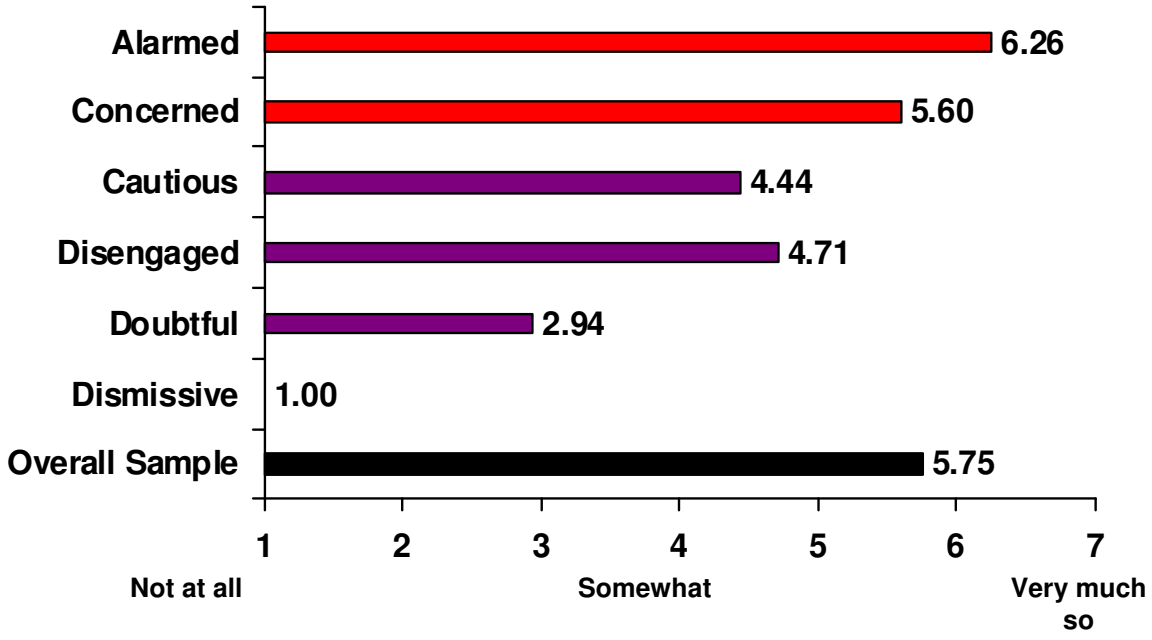


Figure A20. **Average ratings of the extent to which Latin American zoo visitors in each Six Americas segment feel that zoos and aquariums are trustworthy places to find out how to help reduce the effects of global warming**

On average, Latin American zoo visitors who are *alarmed* about global warming more strongly believe that zoos and aquariums are trustworthy places to find out how to help reduce the effects of global warming than are visitors who are *doubtful.* The average trust rating among *alarmed* visitors was 5.77; the average trust rating for *doubtful* visitors was only 3.41.

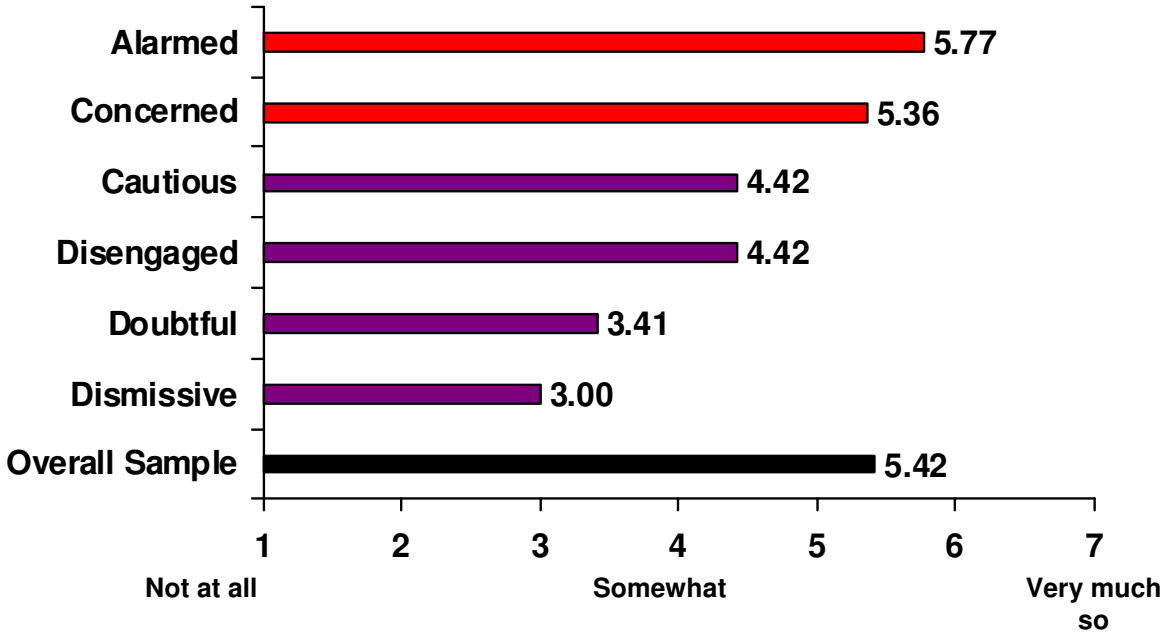
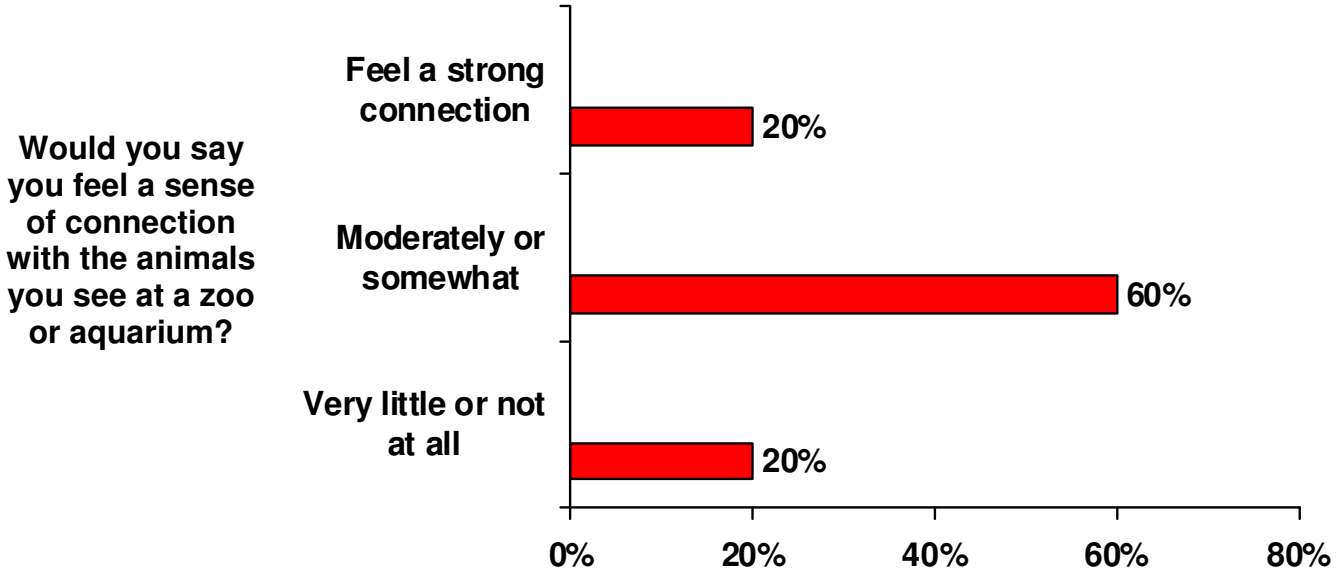


***Figure A21*. Distribution of Latin American zoo visitors based on sense of connection with zoo or aquarium animals**

On average, Latin American zoo visitors rate the strength of their sense of connection with animals they see at the zoo or aquarium 3.41 on a 5-point scale.[1] Twenty percent of Latin American zoo visitors feel a strong connection (rating of 5), 60% feel a moderately or somewhat strong connection (ratings of 3 or 4), and 20% feel little or no connection with animals (ratings of 1 or 2).



[1] Scale: 1 *(not at all)*, 2 *(very little)*, 3 *(somewhat)*, 4 *(moderately)*, 5 *(I feel a strong connection)*

Figure A22. **Average ratings of Latin American zoo visitors' belief that they can have a personal impact on addressing climate change, by strength of connection with zoo animals**

As a Latin American zoo visitor's sense of connection with zoo animals increases, so does his or her perception that he or she can have personal impact on addressing climate change. Visitors who feel a strong sense of connection with zoo animals have greater self-efficacy regarding personal impact on addressing climate change compared to those who feel very little or no connection. On average, visitors who feel a strong connection to animals rate this item 4.46; whereas visitors who feel little or no connection rate this item 3.75.

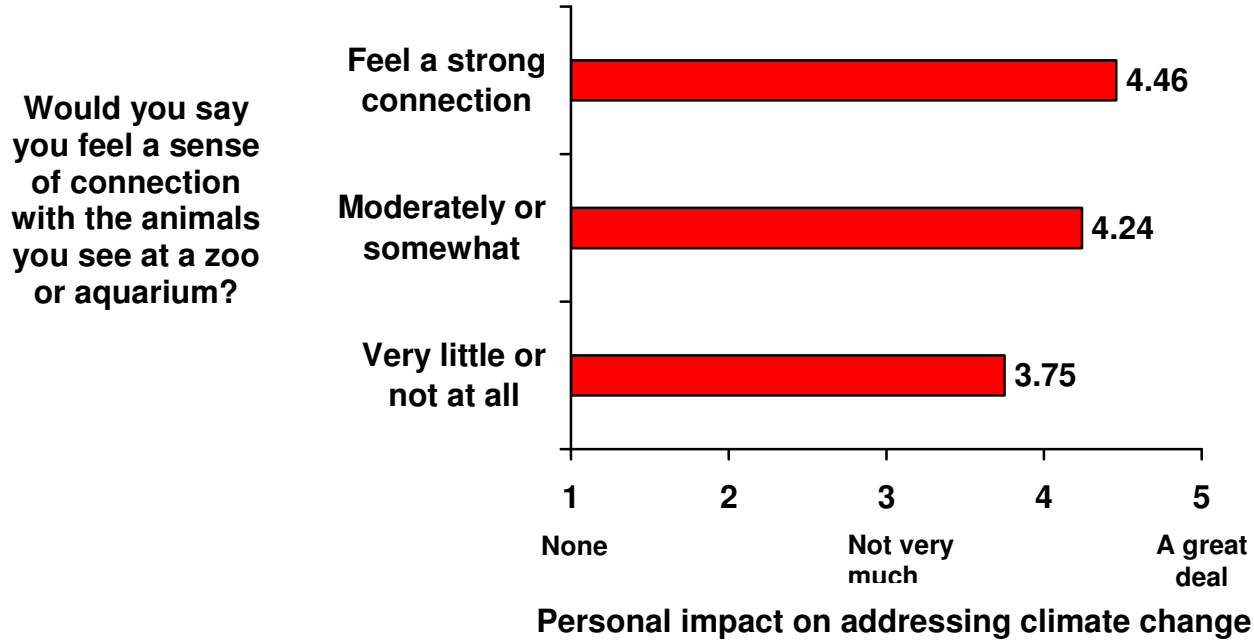


Figure A23. **Average ratings of Latin American zoo visitors' overall concern about the effects of climate change on self, others, and the biosphere, by strength of connection with zoo animals**

As a Latin American zoo visitor's sense of connection with zoo animals increases, so does his or her overall concern about the effects of climate change. Visitors who feel a strong sense of connection with zoo animals have greater overall concern about the effects of climate change on themselves, other people, and the biosphere compared to those who feel very little or no connection. On average, visitors who feel a strong connection to animals rate their concern 6.34; whereas visitors who feel little or no connection rate their concern 5.66. Overall concern is an aggregate rating of 12 items adapted from Schultz's [29] environmental concern scale; in the present study, respondents were asked to rate their level of concern about the effects of *climate change* on these items.

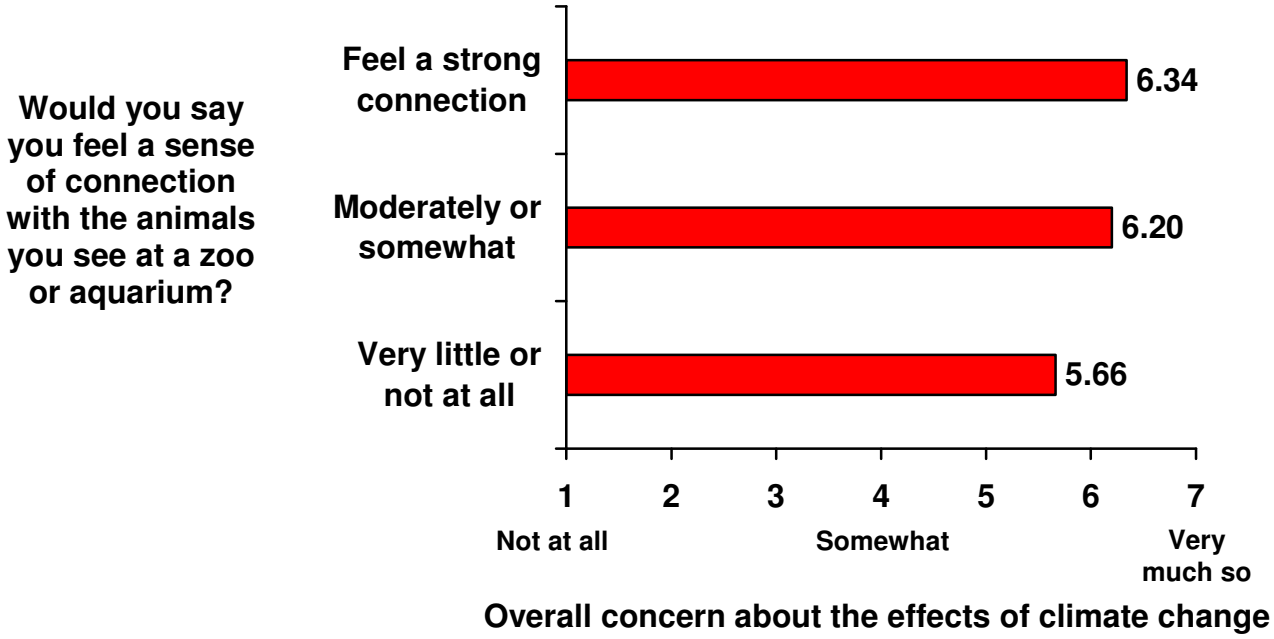
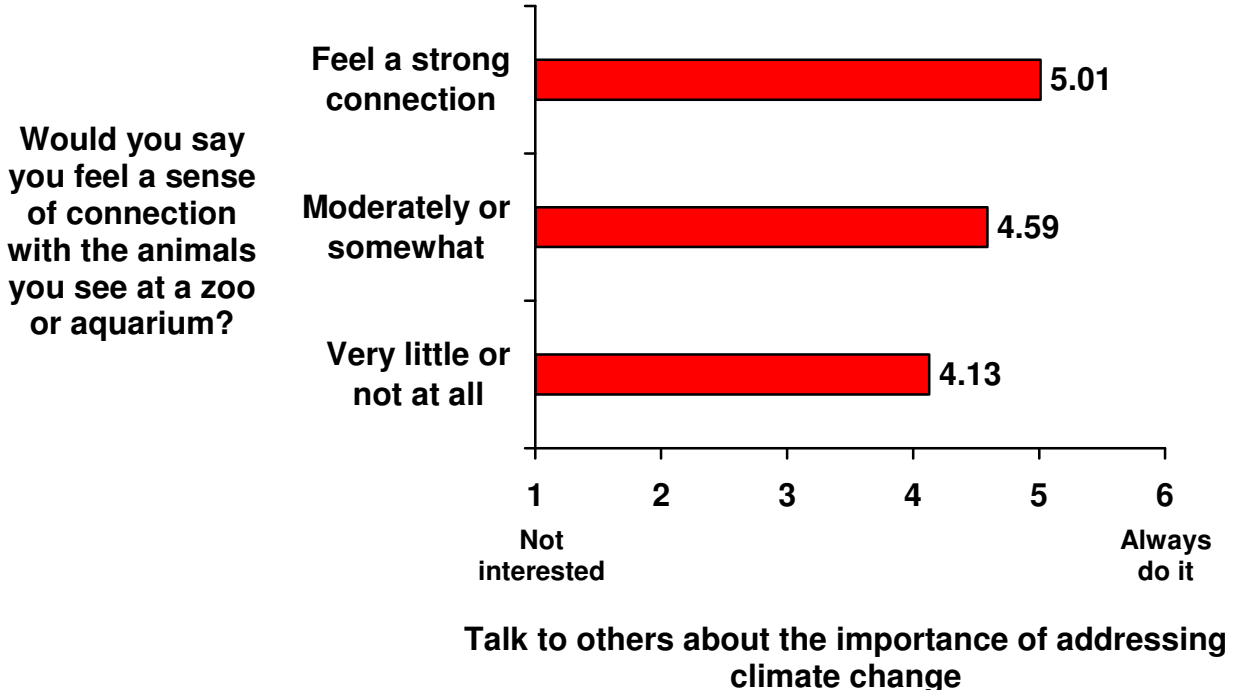


Figure A24. **Average ratings of the extent to which Latin American zoo visitors talk to others about the importance of addressing climate change, by strength of connection with zoo animals**

As a Latin American zoo visitor's sense of connection with zoo or aquarium animals increases, so does the extent to which he or she talks to others about the importance of addressing climate change. Visitors who feel a strong sense of connection with zoo or aquarium animals are more strongly engaged in talking to others about the importance of addressing climate change than those who feel very little or no connection. On average, visitors who feel a strong sense of connection rate this item 5.01,[2] whereas those who feel little to no connection rate it 4.13.



[2] Scale: 1 *(not interested)*, 2 *(never thought about it)*, 3 (*thinking about it)*, 4 *(planning on doing it*), 5 *(do it sometimes)*, 6 *(always do it)*

***Figure A25*. Percentages of Latin American zoo visitors who would like to do more to address climate change, by strength of connection with zoo animals**

Ninety-five percent of visitors who feel a strong connection to zoo or aquarium animals would like to do more to address climate change. For visitors who feel very little or no connection, 80% would like to do more to address climate change.

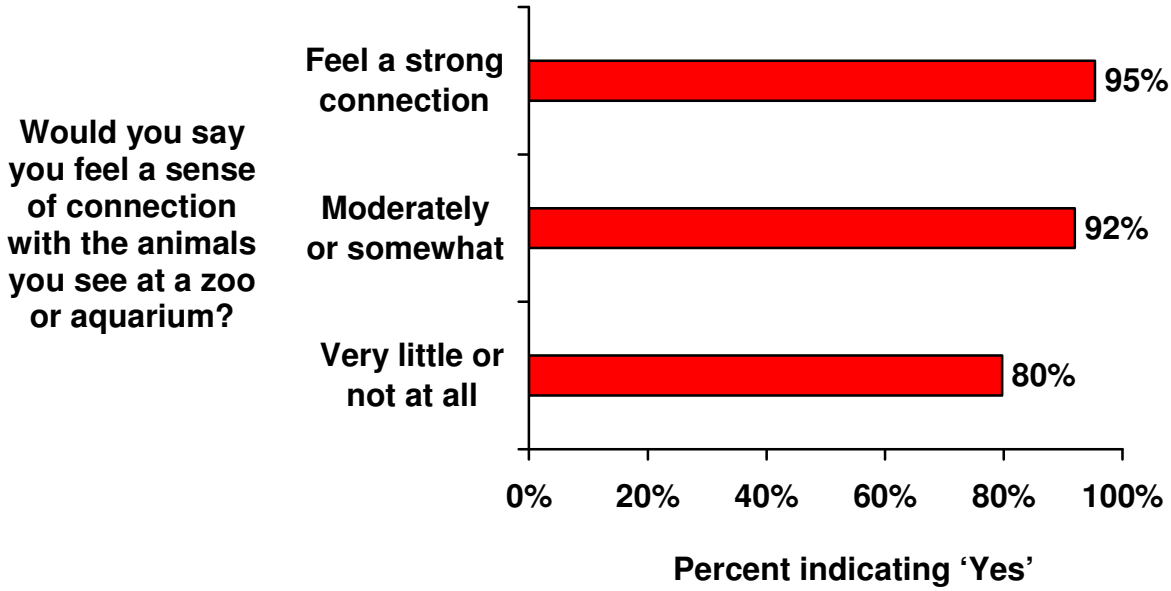
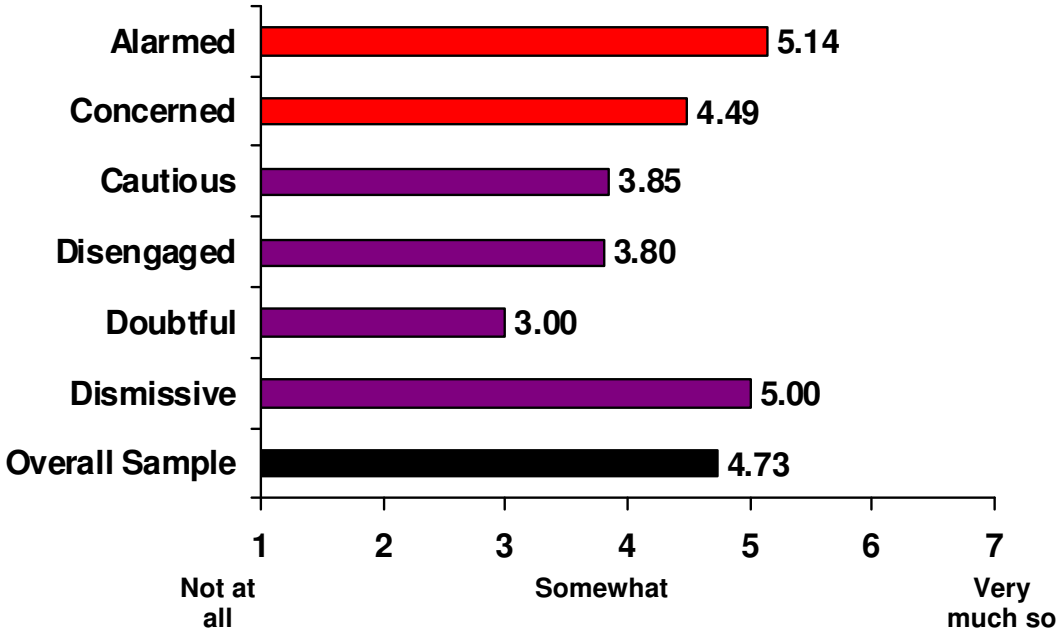


Figure A26. **Average ratings of the extent to which Latin American zoo visitors in each Six Americas segment feel they have a lot in common with other species**

Latin American zoo visitors who are *alarmed* about global warming report feeling a stronger commonality with other species than do visitors who fall within any other Six Americas segment. On average, *alarmed* visitors rate their commonality with other species 5.14; and *doubtful* visitors rate this item 3.00.[3]



[3] *Dismissive* (*n*=3)

Figure A27. **Average ratings of the extent to which Latin American zoo visitors in each Six Americas segment feel a spiritual connection with nature when they are at a zoo**

Latin American zoo visitors who are *alarmed* about global warming report feeling a stronger spiritual connection with nature than do visitors who are *dismissive.* On average, *alarmed* visitors rate the strength of their spiritual connection as 5.90; *doubtful* visitors rate this item 3.29.

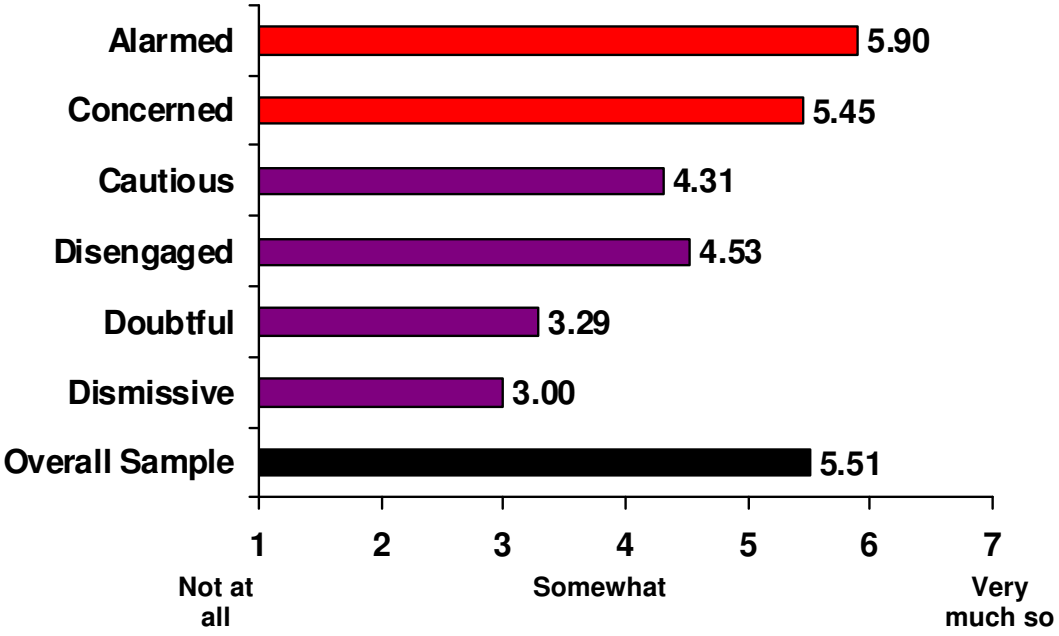
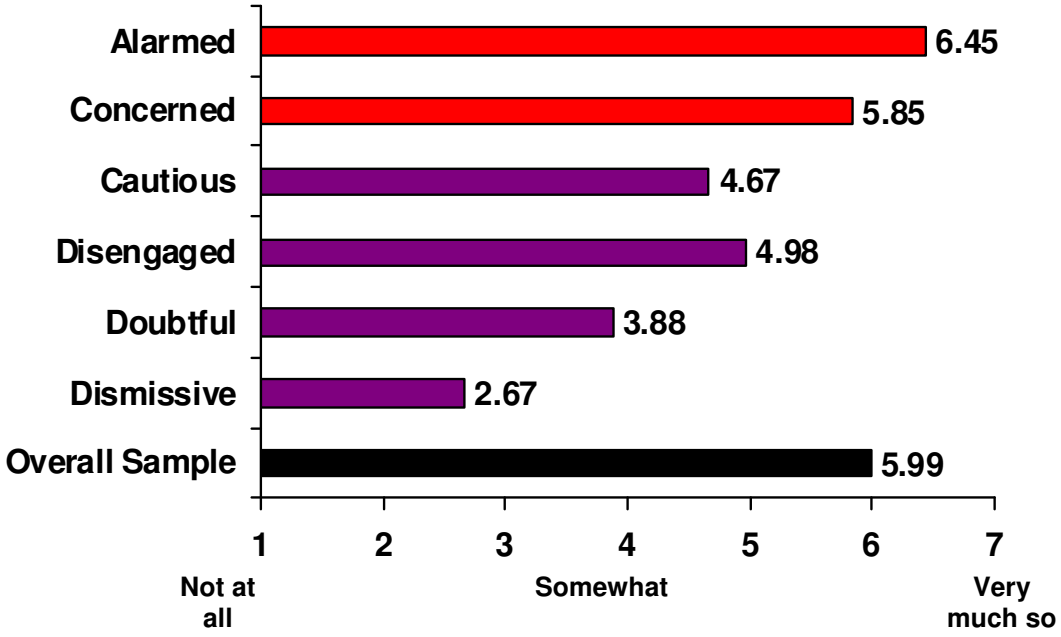


Figure A28. **Average ratings of the extent to which Latin American zoo visitors in each Six Americas segment indicate that seeing animals at a zoo makes them think about their concern for animals in the wild**

Latin American zoo visitors who are *alarmed* about global warming rate the extent to which seeing zoo animals makes them think about their concern for animals in the wild higher than do visitors who are *doubtful.* On average, *alarmed* visitors rate their concern for animals 6.45; *doubtful* visitors rate this item 3.88.



APPENDIX B: DATA TABLES

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Table B1. **Global Warming's Six America Segments (*Attitudes* Survey Form)**

	Number of Respondents	Percent of Total	Six Americas U.S. National Sample May 2011
Alarmed	745	51.6%	12%
Concerned	479	33.1%	27%
Cautious	138	9.6%	25%
Disengaged	62	4.3%	10%
Doubtful	18	1.2%	15%
Dismissive	3	0.2%	10%
Total	1,445	100%	

Table B2. **Certainty of Global Warming (*Attitudes* Survey Form): What do you think? Do you think that global warming is happening?**

	Overall Sample
Yes	93%
No	5%
Don't know	2%

Table B3. **Certainty of Climate Change (*Behaviors* Survey Form): What do you think? Do you think that climate change is happening?**

	Overall Sample
Yes	94%
No	5%
Don't know	1%

Table B4. **Self-perceived knowledge and beliefs about the cause of global warming: Assuming global warming is happening, do you think it is …**

	Overall Sample
Caused mostly by human activities	80%
Caused mostly by natural changes in the environment	17%
Other	2%
Global warming isn't happening	1%

Table B5. **How worried are you about global warming?**

	Overall Sample
Very worried	64%
Somewhat worried	27%
Not very worried	7%
Not at all worried	3%

Table B6. **Risk perceptions: How much do you think global warming will harm you personally?**

	Overall Sample
A great deal	64%
A moderate amount	21%
Only a little	5%
Not at all	2%
Don't know	8%

Table B7. **Risk perceptions: How much do you think global warming will harm future generations of people?**

	Overall Sample
A great deal	76%
A moderate amount	11%
Only a little	3%
Not at all	1%
Don't know	8%

Table B8. **Risk perceptions: When do you think global warming will start to harm people in your country?**

	Overall Sample
They are being harmed now	81%
In 10 years	8%
In 25 years	5%
In 50 years	3%
In 100 years	2%
Never	1%

Table B9. **Issue involvement: How much had you thought about global warming before today?**

	Overall Sample
A lot	32%
Some	49%
A little	13%
Not at all	6%

Table B10. **Issue involvement: How important is the issue of global warming to you personally?**

	Overall Sample
Extremely important	13%
Very important	58%
Somewhat important	21%
Not too important	6%
Not at all important	2%

Table B11. **Attitudinal certainty: How much do you agree or disagree with the following statement: "I could easily change my mind about global warming."**

	Overall Sample
Strongly agree	7%
Somewhat agree	22%
Somewhat disagree	34%
Strongly disagree	37%

Table B12**. Interpersonal communication and social influence: How many of your friends share your views on global warming?**

	Overall Sample
All	10%
Most	32%
Some	38%
A few	16%
None	4%

Table B13. **Mitigation efficacy: Perceptions about the effectiveness of collective action (Which of the following statements comes closest to your view?)**

	Overall Sample
Humans can reduce global warming, and we are going to do so successfully	27%
Humans could reduce global warming, but it's unclear at this point whether we will do what's needed	46%
Humans could reduce global warming, but people aren't willing to change their behavior, so we're not going to	17%
Humans can't reduce global warming, even if it is happening	8%
Global warming isn't happening	2%

Table B14. **Preferred societal response: Do you think citizens themselves should be doing more or less to address global warming?**

	Overall Sample
Much more	57%
More	32%
Currently doing the right amount	6%
Less	4%
Much less	2%

Table B15. **Consumer activism: Over the past 12 months, how many times have you punished companies that are opposing steps to reduce global warming by NOT buying their products?**

	Overall Sample
Many times (6+)	9%
Several times (4-5)	8%
A few times (2-3)	13%
Once	9%
Never	30%
Don't know	21%
Have not had opportunity	11%

Table B16. **National issue priorities: Do you think global warming should be a low, medium, high, or very high priority for your country?**

	Overall Sample
Very high	55%
High	34%
Medium	8%
Low	4%

Table B17. **Support for a national response: Do you think that your country should reduce the emissions that cause the greenhouse effect on its own or according to what other countries do?**

	Overall Sample
Regardless of what other countries do	57%
Only if other industrialized countries reduce their emissions	15%
Only if other industrialized countries and developing countries reduce their emissions	13%
My country should not reduce its emissions	3%
Don't know	13%

Table B18. **I only think of a zoo or aquarium as a place to come with kids, <u>not</u> a place I would visit on my own.** ***(Reverse scale)***

	Overall Sample	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
Very much so (top 2 ratings)	25%	26%	27%	18%	13%	6%	0%
Somewhat (middle 3 ratings)	45%	43%	46%	52%	49%	44%	0%
Not at all (bottom 2 ratings)	30%	32%	26%	31%	38%	50%	100%
Average rating (7-point scale)	3.84	3.83	4.02	3.69	3.29	2.61	1.33

Table B19. **In general, I feel a spiritual connection with nature when I am at a zoo or aquarium.**

	Overall Sample	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
Very much so (top 2 ratings)	59%	71%	55%	28%	36%	18%	33%
Somewhat (middle 3 ratings)	33%	24%	39%	53%	45%	41%	0%
Not at all (bottom 2 ratings)	8%	5%	6%	19%	19%	41%	67%
Average rating (7-point scale)	5.51	5.90	5.45	4.31	4.53	3.29	3.00

Table B20. **I feel I have a lot in common with other species.**

	Overall Sample	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
Very much so (top 2 ratings)	39%	49%	32%	18%	27%	6%	67%
Somewhat (middle 3 ratings)	47%	41%	54%	57%	40%	53%	0%
Not at all (bottom 2 ratings)	14%	10%	15%	26%	33%	41%	33%
Average rating (7-point scale)	4.73	5.14	4.49	3.85	3.80	3.00	5.00

Table B21. **I enjoy discussing the exhibit signs and displays with my family or companions while I am at a zoo or aquarium**

	Overall Sample	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
Very much so (top 2 ratings)	49%	59%	43%	24%	37%	29%	33%
Somewhat (middle 3 ratings)	42%	36%	47%	56%	43%	35%	0%
Not at all (bottom 2 ratings)	10%	6%	10%	20%	20%	35%	67%
Average rating (7-point scale)	5.13	5.52	4.93	4.16	4.54	3.76	2.67

Table B22. **I use my visits to zoos or aquariums as a chance to talk to my family or companions about our relationships to nature**

	Overall Sample	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
Very much so (top 2 ratings)	64%	76%	57%	28%	47%	18%	33%
Somewhat (middle 3 ratings)	31%	22%	38%	59%	36%	41%	0%
Not at all (bottom 2 ratings)	5%	2%	5%	13%	16%	41%	67%
Average rating (7-point scale)	5.71	6.16	5.55	4.50	4.89	3.18	2.67

Table B23. **Seeing animals at a zoo or aquarium makes me think about my concern for animals in the wild**

	Overall Sample	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
Very much so (top 2 ratings)	72%	85%	67%	33%	50%	25%	33%
Somewhat (middle 3 ratings)	24%	13%	29%	58%	37%	50%	0%
Not at all (bottom 2 ratings)	4%	1%	3%	9%	13%	25%	67%
Average rating (7-point scale)	5.99	6.45	5.85	4.67	4.98	3.88	2.67

Table B24. **When I am at a zoo or aquarium I am interested in finding out more about how global warming is affecting wildlife and their natural habitats**

	Overall Sample	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
Very much so (top 2 ratings)	66%	81%	60%	27%	44%	12%	0%
Somewhat (middle 3 ratings)	29%	17%	36%	60%	38%	41%	0%
Not at all (bottom 2 ratings)	5%	2%	5%	13%	18%	47%	100%
Average rating (7-point scale)	5.75	6.26	5.60	4.44	4.71	2.94	1.00

Table B25. **Zoos and aquariums are trustworthy places to find out how to help reduce the effects of global warming**

	Overall Sample	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
Very much so (top 2 ratings)	57%	67%	55%	24%	36%	18%	33%
Somewhat (middle 3 ratings)	34%	27%	36%	64%	45%	47%	0%
Not at all (bottom 2 ratings)	9%	6%	9%	12%	19%	35%	67%
Average rating (7-point scale)	5.42	5.77	5.36	4.42	4.42	3.41	3.00

Table B26. **You spend as much time as you can in natural settings such as woods, prairies, mountains or lakes**

	Overall Sample	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
Very much so (top 2 ratings)	34%	45%	27%	11%	19%	18%	33%
Somewhat (middle 3 ratings)	52%	48%	57%	61%	45%	41%	33%
Not at all (bottom 2 ratings)	14%	7%	17%	28%	36%	41%	33%
Average rating (7-point scale)	4.60	5.12	4.28	3.50	3.43	3.29	4.00

Table B27. **You usually try to help protect and preserve local wildlife habitats**

	Overall Sample	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
Very much so (top 2 ratings)	48%	60%	38%	18%	32%	24%	67%
Somewhat (middle 3 ratings)	45%	37%	52%	63%	54%	59%	0%
Not at all (bottom 2 ratings)	7%	3%	9%	20%	15%	18%	33%
Average rating (7-point scale)	5.16	5.67	4.83	3.98	4.50	4.12	4.67

Table B28. **You tend to support conservation organizations (volunteer your time, make a donation, sign a petition, etc.)**

	Overall Sample	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
Very much so (top 2 ratings)	22%	27%	19%	12%	18%	12%	33%
Somewhat (middle 3 ratings)	44%	44%	39%	59%	37%	47%	0%
Not at all (bottom 2 ratings)	35%	30%	43%	29%	45%	41%	67%
Average rating (7-point scale)	3.66	3.91	3.36	3.48	3.31	3.24	3.33

Table B29. **You typically engage in conservation efforts during your daily activities (recycling, reducing energy usage, buying earth-friendly products, etc.)**

	Overall Sample	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
Very much so (top 2 ratings)	45%	58%	36%	20%	35%	18%	33%
Somewhat (middle 3 ratings)	45%	37%	54%	62%	37%	59%	0%
Not at all (bottom 2 ratings)	10%	5%	11%	18%	28%	24%	67%
Average rating (7-point scale)	5.03	5.50	4.71	4.06	4.22	3.71	3.33

Table B30. **Trust the following sources of information about climate change: Environmental organizations**

	Overall Sample
Very much so (top 2 ratings)	65%
Somewhat (middle 3 ratings)	30%
Not at all (bottom 2 ratings)	5%
Average rating (7-point scale)	5.73

Table B31. **Trust the following sources of information about climate change: Scientists**

	Overall Sample
Very much so (top 2 ratings)	62%
Somewhat (middle 3 ratings)	30%
Not at all (bottom 2 ratings)	8%
Average rating (7-point scale)	5.57

Table B32**. Trust the following sources of information about climate change: Zoos and aquariums**

	Overall Sample
Very much so (top 2 ratings)	54%
Somewhat (middle 3 ratings)	38%
Not at all (bottom 2 ratings)	8%
Average rating (7-point scale)	5.33

Table B33. **Trust the following sources of information about climate change: Mainstream news media**

	Overall Sample
Very much so (top 2 ratings)	35%
Somewhat (middle 3 ratings)	51%
Not at all (bottom 2 ratings)	14%
Average rating (7-point scale)	4.63

Table B34. **Trust the following sources of information about climate change: Family and friends**

	Overall Sample
Very much so (top 2 ratings)	27%
Somewhat (middle 3 ratings)	56%
Not at all (bottom 2 ratings)	18%
Average rating (7-point scale)	4.25

Table B35. **Trust the following sources of information about climate change: Government agencies**

	Overall Sample
Very much so (top 2 ratings)	22%
Somewhat (middle 3 ratings)	47%
Not at all (bottom 2 ratings)	31%
Average rating (7-point scale)	3.71

Table B36. **How much do you agree about climate change: It threatens the survival of species worldwide**

	Overall Sample
Very much so (top 2 ratings)	85%
Somewhat (middle 3 ratings)	13%
Not at all (bottom 2 ratings)	2%
Average rating (7-point scale)	6.43

Table B37. **How much do you agree about climate change: It threatens the survival of wildlife in arctic areas**

	Overall Sample
Very much so (top 2 ratings)	83%
Somewhat (middle 3 ratings)	14%
Not at all (bottom 2 ratings)	3%
Average rating (7-point scale)	6.35

Table B38. **How much do you agree about climate change: It threatens ocean health**

	Overall Sample
Very much so (top 2 ratings)	78%
Somewhat (middle 3 ratings)	18%
Not at all (bottom 2 ratings)	3%
Average rating (7-point scale)	6.19

Table B39. **How much do you agree about climate change: It threatens the survival of wildlife in my region of the country**

	Overall Sample
Very much so (top 2 ratings)	76%
Somewhat (middle 3 ratings)	21%
Not at all (bottom 2 ratings)	3%
Average rating (7-point scale)	6.12

Table B40. **How much do you agree about climate change: It will lead to an increase in extreme weather events**

	Overall Sample
Very much so (top 2 ratings)	72%
Somewhat (middle 3 ratings)	24%
Not at all (bottom 2 ratings)	4%
Average rating (7-point scale)	5.97

Table B41. **How much do you agree about climate change: It threatens human health**

	Overall Sample
Very much so (top 2 ratings)	67%
Somewhat (middle 3 ratings)	29%
Not at all (bottom 2 ratings)	4%
Average rating (7-point scale)	5.81

Table B42. **How concerned are you about the effects of climate change on: You**

	Overall Sample
Very much so (top 2 ratings)	73%
Somewhat (middle 3 ratings)	23%
Not at all (bottom 2 ratings)	4%
Average rating (7-point scale)	6.05

***Table B43*. How concerned are you about the effects of climate change on: Your health**

	Overall Sample
Very much so (top 2 ratings)	66%
Somewhat (middle 3 ratings)	29%
Not at all (bottom 2 ratings)	6%
Average rating (7-point scale)	5.77

***Table B44.* How concerned are you about the effects of climate change on: Your lifestyle**

	Overall Sample
Very much so (top 2 ratings)	64%
Somewhat (middle 3 ratings)	31%
Not at all (bottom 2 ratings)	5%
Average rating (7-point scale)	5.68

***Table B45.* How concerned are you about the effects of climate change on: Your future**

	Overall Sample
Very much so (top 2 ratings)	76%
Somewhat (middle 3 ratings)	21%
Not at all (bottom 2 ratings)	3%
Average rating (7-point scale)	6.11

Table B46. **How concerned are you about the effects of climate change on: Children**

	Overall Sample
Very much so (top 2 ratings)	83%
Somewhat (middle 3 ratings)	15%
Not at all (bottom 2 ratings)	3%
Average rating (7-point scale)	6.34

Table B47. **How concerned are you about the effects of climate change on: People in your country**

	Overall Sample
Very much so (top 2 ratings)	64%
Somewhat (middle 3 ratings)	31%
Not at all (bottom 2 ratings)	6%
Average rating (7-point scale)	5.68

Table B48. **How concerned are you about the effects of climate change on: Humanity**

	Overall Sample
Very much so (top 2 ratings)	79%
Somewhat (middle 3 ratings)	18%
Not at all (bottom 2 ratings)	4%
Average rating (7-point scale)	6.19

Table B49. **How concerned are you about the effects of climate change on: Future generations**

	Overall Sample
Very much so (top 2 ratings)	83%
Somewhat (middle 3 ratings)	14%
Not at all (bottom 2 ratings)	3%
Average rating (7-point scale)	6.35

Table B50. **How concerned are you about the effects of climate change on: Marine life**

	Overall Sample
Very much so (top 2 ratings)	80%
Somewhat (middle 3 ratings)	17%
Not at all (bottom 2 ratings)	3%
Average rating (7-point scale)	6.25

Table B51. **How concerned are you about the effects of climate change on: Animals**

	Overall Sample
Very much so (top 2 ratings)	82%
Somewhat (middle 3 ratings)	16%
Not at all (bottom 2 ratings)	3%
Average rating (7-point scale)	6.32

Table B52. **How concerned are you about the effects of climate change on: Birds**

	Overall Sample
Very much so (top 2 ratings)	74%
Somewhat (middle 3 ratings)	22%
Not at all (bottom 2 ratings)	4%
Average rating (7-point scale)	6.05

Table B53. **How concerned are you about the effects of climate change on: Plants**

	Overall Sample
Very much so (top 2 ratings)	71%
Somewhat (middle 3 ratings)	25%
Not at all (bottom 2 ratings)	4%
Average rating (7-point scale)	5.96

Table B54. **Current behaviors: Buy food grown locally**

	Overall Sample
Always do it	18%
Do it sometimes	40%
Thinking about it/ Planning on doing it	25%
Never thought about it/ Not interested	17%

Table B55. **Current behaviors: Make at least one dinner a week meatless**

	Overall Sample
Always do it	27%
Do it sometimes	34%
Thinking about it/ Planning on doing it	26%
Never thought about it/ Not interested	13%

Table B56. **Current behaviors: Swap out all common household light bulbs for compact fluorescents**

	Overall Sample
Always do it	58%
Do it sometimes	17%
Thinking about it/ Planning on doing it	19%
Never thought about it/ Not interested	6%

Table B57. **Current behaviors: Drive a fuel-efficient car**

	Overall Sample
Always do it	22%
Do it sometimes	16%
Thinking about it/ Planning on doing it	40%
Never thought about it/ Not interested	22%

Table B58. **Current behaviors: Turn your thermostat to 18 degrees or lower in winter and up to 25 degrees in summer**

	Overall Sample
Always do it	23%
Do it sometimes	16%
Thinking about it/ Planning on doing it	31%
Never thought about it/ Not interested	30%

Table B59. **Current behaviors: Talk to others about the importance of addressing climate change**

	Overall Sample
Always do it	28%
Do it sometimes	33%
Thinking about it/ Planning on doing it	32%
Never thought about it/ Not interested	6%

Table B60. **Current behaviors: Donate money to a conservation or environmental group**

	Overall Sample
Always do it	8%
Do it sometimes	18%
Thinking about it/ Planning on doing it	54%
Never thought about it/ Not interested	21%

Table B61. **Current behaviors: Sign a petition or support political parties that protect the environment**

	Overall Sample
Always do it	17%
Do it sometimes	19%
Thinking about it/ Planning on doing it	41%
Never thought about it/ Not interested	24%

Table B62. **From the previous list, select up to three actions that you feel have the most impact on climate change (Percent selecting item).**

	Overall Sample
Swap out all common household light bulbs for compact fluorescents	54%
Drive a fuel-efficient car	43%
Talk to others about the importance of addressing climate change	40%
Turn your thermostat to 18 degrees or lower in winter and up to 25 degrees in summer	30%
Buy food grown locally	20%
Sign a petition or support political parties that protect the environment	19%
Make at least one dinner a week "meatless"	16%
Donate money to a conservation or environmental group	14%
None of the above	6%

Table B63. **How much of an impact do you believe you can have personally on addressing climate change?**

	Overall Sample
A great deal	48%
A fair amount	32%
Not very much	12%
Almost none at all	6%
None	2%
Average rating (5-point scale)	4.18

Table B64. **Would you like to do more to address climate change?**

	Overall Sample
Yes	88%
No	12%

Table B65. **If yes, what is standing in your way? (Select all that apply – Percent selecting item)**

	Overall Sample
I don't know what actions would be effective	39%
The necessary actions are too time consuming	18%
The necessary actions would cost too much money	17%
I'm unsure if my actions will make a difference	16%
My friends or family would not support my actions	13%
The necessary actions are too inconvenient or difficult	9%
The necessary actions would make life less comfortable	7%
Percent of respondents identifying at least one barrier standing in their way	96%

Table B66. **Would you say you feel a sense of connection with the animals you see at a zoo or aquarium?**

	Overall Sample
I feel a strong connection	20%
Moderately/ Somewhat	60%
Very little/ Not at all	20%
Average rating (5-point scale)	3.41

Table B67. **To what extent do you think of yourself as: Spiritual**

	Overall Sample
Very much so (top 2 ratings)	47%
Somewhat (middle 3 ratings)	40%
Not at all (bottom 2 ratings)	13%
Average rating (7-point scale)	5.01

Table B68. **To what extent do you think of yourself as: Religious**

	Overall Sample
Very much so (top 2 ratings)	40%
Somewhat (middle 3 ratings)	44%
Not at all (bottom 2 ratings)	17%
Average rating (7-point scale)	4.69

Table B69. **Do you have a cell phone/mobile device with you today that has an Internet connection? (Percent indicating 'Yes')**

	Overall Sample
60+ years old	19%
50-59 years old	28%
40-49 years old	35%
30-39 years old	37%
25-29 years old	35%
18-24 years old	40%
Overall	36%

Table B70. **How frequently do you usually visit zoos or aquariums? (*Attitudes* Survey Form)**

	Overall Sample	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
Often	17%	22%	14%	12%	11%	0%	0%
Occasionally	55%	55%	56%	54%	55%	61%	33%
Rarely	27%	23%	30%	34%	35%	39%	67%

Table B71. **How frequently do you usually visit zoos or aquariums? (*Behaviors* Survey Form)**

	Overall Sample
Often	16%
Occasionally	49%
Rarely	35%

Table B72. **Are you currently a member of this zoo or aquarium? (*Attitudes* Survey Form)**

	Overall Sample	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
Yes	4%	3%	3%	3%	5%	6%	33%
No	96%	97%	97%	97%	95%	94%	67%

Table B73. **Are you currently a member of this zoo or aquarium? (*Behaviors* Survey Form)**

	Overall Sample
Yes	4%
No	96%

Table B74. **Your gender (*Attitudes* Survey Form)**

	Overall Sample	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
Female	47%	56%	54%	43%	46%	35%	33%
Male	53%	44%	46%	57%	54%	65%	67%

Table B75. **Your gender (*Behaviors* Survey Form)**

	Overall Sample
Female	50%
Male	50%

Table B76. **Your age (*Attitudes* Survey Form)**

	Overall Sample	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
60 years old or older	3%	3%	3%	5%	5%	0%	0%
50-59 years old	6%	7%	5%	8%	2%	0%	0%
40-49 years old	16%	20%	12%	15%	15%	18%	33%
30-39 years old	31%	31%	32%	28%	34%	35%	0%
25-29 years old	20%	18%	22%	25%	20%	18%	0%
18-24 years old	23%	22%	26%	20%	24%	29%	67%
Average age	33.4	34.2	32.2	34.3	32.8	30.7	26.3

***Table B77*. Your age (*Behaviors* Survey Form)**

	Overall Sample
60 years old or older	3%
50-59 years old	6%
40-49 years old	16%
30-39 years old	32%
25-29 years old	19%
18-24 years old	24%
Average age	33.2

***Table B78.* Including yourself, what is the <u>total</u> number of people in your group today? (*Attitudes* Survey Form)**

	Overall Sample	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
7 or more people	20%	19%	21%	21%	26%	17%	0%
5-6 people	25%	28%	23%	19%	23%	39%	0%
3-4 people	40%	41%	39%	34%	40%	39%	100%
1-2 people	15%	12%	17%	26%	11%	6%	0%
Average number of people in group	6.2	6.3	6.4	5.3	6.7	5.0	3.7

Table B79. **Including yourself, what is the <u>total</u> number of people in your group today? (*Behaviors* Survey Form)**

	Overall Sample
7 or more people	17%
5-6 people	24%
3-4 people	43%
1-2 people	15%
Average number of people in group	5.8

Table B80. **How many in group are younger than 13 years old? (Attitudes Survey Form)**

	Overall Sample	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
7 or more children	4%	4%	4%	3%	7%	0%	0%
5-6 children	2%	2%	3%	3%	2%	0%	0%
3-4 children	14%	13%	15%	12%	16%	17%	33%
1-2 children	52%	55%	50%	46%	48%	61%	33%
No children in group	29%	27%	29%	36%	28%	22%	33%
Average number of children in group	2.0	2.1	2.1	1.5	2.0	1.4	2.0

Table B81. **How many in group are younger than 13 years old? (*Behaviors* Survey Form)**

	Overall Sample
7 or more children	3%
5-6 children	1%
3-4 children	10%
1-2 children	53%
No children in group	33%
Average number of children in group	1.8

Table B82. Do you live in… **(*Attitudes* Survey Form)**

	Overall Sample	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
Large city	68%	70%	68%	66%	64%	67%	100%
Small city	23%	21%	24%	31%	23%	33%	0%
Rural area	9%	9%	9%	3%	13%	0%	0%

Table B83. Do you live in… **(*Behaviors* Survey Form)**

	Overall Sample
Large city	65%
Small city	24%
Rural area	12%

APPENDIX C: METHODS

The goal of this study was to gain information that would allow zoos to effectively develop educational resources that build on visitors' values and emotional connections with animals and inspire actions that have a positive collective impact on mitigating climate change. Four research questions were posed to guide the analyses of the surveys:

1. What are Latin American zoo visitors' beliefs, attitudes, and behaviors concerning climate change?
2. What are the cognitive, emotional, and behavioral barriers to engaging in climate change action among Latin American zoo visitors?
3. Do Latin American zoos provide socially supportive and motivating contexts for discussions and responses to climate change?
4. Are Latin American zoo visitors' personal and emotional connections to animals and nature related to their disposition toward changes in behaviors that affect climate change?

Survey instrument development

Surveys administered to Latin American zoo visitors were adapted from surveys initially designed for administration in U.S. zoos and aquariums [19]. The English language surveys were translated into Spanish and Portuguese with some modification to improve local relevance. The primary change was to survey items that specifically asked about the United States, which were revised to ask about "your country" or "your government." At the beginning of the English survey development process our biggest challenge was to develop a comprehensive survey that was relatively short and practical for visitors to complete during their visits to our institutions. Given the large amount of information we wanted to collect from visitors, the decision was made to create two independent short paper surveys: (a) a survey primarily focused on *attitudes* and (b) a survey primarily focused on *behaviors*. Thus, by using two surveys, we could minimize the time needed to complete an individual survey while still being able to collect a broad range of information. The intent was that each institution would distribute both surveys simultaneously (randomly alternating surveys) to visitors. Each visitor would then complete only one of the two surveys.

Survey instrument content

The visitor *attitudes* survey served as an opportunity to categorize Latin American zoo visitors according to the "Global Warming's Six Americas" framework [18]. The "Six Americas" U.S. national study [23] conducted by the Yale Project on Climate Change Communications and the George Mason University Center for Climate Change Communication aimed to provide a baseline for understanding the American public's attitudes about global warming in order to provide a foundation for effective communication about this topic. Their study revealed that based upon beliefs about global warming, six unique audience segments appear to exist among the American public. These six segments (which form a continuum) were labeled: Alarmed, Concerned, Cautious, Disengaged, Doubtful, and Dismissive. According to Maibach et al. [22], the six audience segments were determined via a nationally representative 2008 survey of 2,164 U.S. adults who participated in an online panel. Panelists responded to items about global warming beliefs, issue involvement, behaviors, and preferred societal responses. The audience segments were determined via Latent Class Analysis and validated by a

discriminant analysis. The researchers also developed a short segmentation tool which contained 15 survey items from their original study. These 15 items were combined with attitudinal items regarding visitors' general experiences at zoos, their sense of connection to animals and nature, and their previous behaviors concerning environmental and conservation activities to constitute the visitor *attitudes* survey form.

The visitor *behaviors* survey contained eight behavioral items to assess visitors' current actions in addressing climate change. These items concerned various consumer behaviors and other conservation support behaviors. Most of these items came from a visitor survey that was used in 2009 at three Northwest Zoo & Aquarium Alliance institutions (Oregon Coast Aquarium, Oregon Zoo, and Woodland Park Zoo). Other items on the *behaviors* survey included: (1) visitors' perceived personal control over addressing climate change and various perceived barriers to their actions; (2) level of trust of various information sources about climate change; (3) awareness of climate change threats; (4) sense of connection with zoo animals; (5) concern about the effects of climate change on self, other people, and the biosphere (these items were based on a validated survey instrument focused on environmental concern (Schultz, [29]); and (6) religious and spiritual perspectives. In addition, the visitor *behaviors* survey consistently used the term "climate change" (vs. "global warming") to determine any differences in visitors' responses to the two different phrases.

Finally, both the visitor *attitudes* and *behaviors* survey forms contained identical demographic items on group composition, visitors' home location (large city, small city, or rural area), age, gender, frequency of zoo or aquarium visits, and membership status at the particular zoo the respondent was visiting that day.

Survey sites

Surveys were collected at eight Latin American zoos: Africam Safari (Puebla, Mèxico), Fundación Parque Zoológico de São Paulo (São Paulo, Brazil), Fundación Temaikèn (Escobar, Argentina), Fundación Zoológica de Cali (Cali, Colombia), Fundación Zoológica de Barranquilla (Barranquilla, Colombia), Fundación Zoológico de Santacruz (Bogotá, Colombia), Jardin Zoológico de la Ciudad de Buenos Aires (Buenos Aires, Argentina), and Zoológico de Quito en Guayllabamba (Quito, Ecuador).

Data collection and entry

General data collection took place between June 15 and August 25, 2011 and followed the same protocols and procedures implemented in the U.S. zoos [19]. Data collection was conducted by institutional staff at each participating zoo. Each site had a designated staff member to coordinate and supervise the data collection. These staff members received standard training and procedure documents via email from the Chicago Zoological Society and communicated with Chicago Zoological Society staff for questions and clarification. Each institution distributed both survey forms simultaneously, randomly alternating between the visitor *attitudes* and *behaviors* survey forms. Each respondent completed only one of the two survey forms (*attitudes* or *behaviors*). Data collectors kept a running count of the number of visitors who declined to complete a survey. The overall response rate was 26%. Response rates at each site varied, and ranged from 7% to 63%.

Once collected, paper surveys were mailed to Chicago Zoological Society for data entry. Surveys were deemed "usable" and entered only if at least 50% of the survey was completed and

if the respondents were aged 18 years or older. The overall final count of usable surveys was 2,946 (Table C1). For the attitudes survey, the margin of sampling error is plus or minus 2.57% with 95% confidence and for the behaviors survey, the margin of sampling error is 2.54% with 95% confidence.

***Table C1*. Total number of usable surveys**

	Attitudes **survey form**	***Behaviors*** **survey form**	**Overall**
Zoos (8 locations)	1,453	1,493	2,946

Data analysis

The visitor *attitudes* survey contained the "Global Warming's Six Americas" 15-item screening tool. In order to segment respondents into one of the Six America's audience segments, visitor responses to the 15 items were subjected to variable coding and statistical procedures as outlined in the Global Warming's Six Americas Screening Tool Manual [21]. SPSS Version 15 was used to run the manual's SPSS syntax containing the linear discriminant functions that classified respondents into one of the six segments. After the segmentation procedure was completed, a discriminant analysis using the responses to the 15 items was conducted to compare our results with the Six Americas segmentation of zoo visitors. Overall, results indicated that 85.4% of the Latin American visitors were correctly classified into the Six Americas segments. Examining the results by segment revealed that classifying "Alarmed" and "Dismissive" segments had the highest correct hit rates (92.9% and 100% respectively), whereas classifying the "Doubtful" and "Concerned" segments had the lowest correct hit rates (61.1% and 74.9% respectively).

Survey items related to visitors' concern about the effects of climate change were adapted from Schultz [29]. Previous analyses of respondents' ratings to the 12 items have uncovered three distinct factors of environmental concern related to concern for self, concern for others, and concern for the biosphere (each factor or sub-score reflecting the ratings of four survey items each). However, our own factor analysis of visitors' ratings revealed that as a group, the 12 items were factor free and only grouped into one overall factor. Furthermore, the internal consistency of the 12 ratings was quite high with a Coefficient Alpha of .95. One possible reason for our findings may be related to the rating directions for these items. Previous studies have used the expression 'concerned about environmental problems' in the directions. Whereas, for our study we used the expression 'concerned about the effects of climate change'. This change in directions may have had an impact on how zoo visitors responded to these survey items. As such, we simply computed one overall concern score for respondents based on their ratings across the 12 items.