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# Winds of Change? Exploring Climate Change-Driven Migration and Related Impacts in the Pacific Northwest

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# *Winds of Change?*

Exploring climate change-driven migration  
and related impacts in the Pacific Northwest

## *Symposium Summary*

*December 1, 2016*

*Prepared by*

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# Acknowledgements

## STEERING COMMITTEE

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Presentations from the “Winds of Charge” symposium were recorded and are available for viewing at: <https://cig.uw.edu/news-and-events/events/migration-symposium/>

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### Additional reading:

*Climate Change, Migration, and the Puget Sound Region: What We Know and How We Could Learn More*. 2015.

Report prepared by Alison Saperstein for the University of Washington Climate Impacts Group. Available at: <https://cig.uw.edu/publications/climate-change-migration-and-the-puget-sound-region/>

*Environmental Migrants and the Future of the Willamette Valley: A Preliminary Exploration*. 2011. Portland State University, Fall 2011, USP 594: Planning In The Pacific Northwest. Available at: [https://www.pdx.edu/usp/sites/www.pdx.edu.usp/files/Environmental\\_Migrants.pdf](https://www.pdx.edu/usp/sites/www.pdx.edu.usp/files/Environmental_Migrants.pdf)

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# Executive Summary

In recent years, speculation by the media, bloggers, and the public about the potential for large numbers of “climate refugees” coming to the Pacific Northwest has led to a growing number of questions about the potential for climate change-driven migration to the Northwest and whether long-term planning decisions related to land use, transportation, utilities, and other public services need to account for higher population levels.

Recognizing the need for expert-based guidance on the issue, Portland State University, the University of Washington Climate Impacts Group, and 15 other public agencies and communities in Washington and Oregon convened a first-of-its-kind symposium on June 24, 2016, to discuss whether the Pacific Northwest should be planning for more growth as a result of climate change, and if so, to outline the appropriate steps for producing population forecasts informed by climate change-driven migration.

“The Winds of Change? Exploring Climate Change-driven Migration and Related Impacts in the Pacific Northwest” convened experts in climate science, population dynamics, and public sector management, as well as members of the media, the non-profit sector, and the public, for a day of presentations and discussion. The morning public plenary session provided an overview of what we currently know about migration trends, including the role of climate and age structure in influencing past and current migration patterns, and perspectives on how we might move forward on developing a better understanding of the intersection between climate change and population migration issues in the Northwest.

The symposium’s afternoon work session built on the morning public plenary to discuss the specific information and research needed to help answer questions about the potential for climate change-driven migration to Washington and Oregon. Topics included whether there is a need to develop a “climate migration factor” for current demographic projections, how demographers and practitioners deal with or think about uncertainties embedded in current demographic projections, and priority research topics for improving the region’s understanding of climate change-driven migration and directions for future planning.

Discussions at the symposium clearly indicated a desire and a need among public sector decision makers to better understand if and how climate change-driven migration may affect existing assumptions about population growth in the region. However, most participants felt it would be premature to make changes to current population forecasting models. Instead, demographers, researchers, and decision makers should work on identifying the additional data, information, methodologies, and modeling needed to systematically assess the question of climate change-driven migration. Together, these findings underscore the importance of expanding research and information around climate change-driven migration in the Northwest.

# Introduction

Climate change is expected to have significant impacts on the Pacific Northwest's communities, economy, and natural systems (see, for example, Dalton et al. 2013, Snover et al. 2013, Mauger et al. 2015). These impacts – which include reductions in summer water supply, the potential for more winter flooding and forest fires, threats to public health, and damage to coastal infrastructure due to sea level rise – will require changes in how communities evaluate, manage, and mitigate environmental risks.

Despite these challenges, some have suggested that the region may be relatively well off compared to other areas of the U.S. and the world. This has led to growing speculation by the media, bloggers, and the public that “global warming could unleash a deluge of newcomers” (or “climate refugees”) to the Pacific Northwest in coming years (Box 1).<sup>1</sup> The question is also gaining the attention of public sector professionals in the region. Planners and managers who engage in long-term planning for transportation, public health, utilities, and other public services want to understand whether population forecasts—an important analytical tool guiding many areas of regional planning—should reflect the possible impacts of climate change on migration flows, and if so, how?

The connection between climate change and migration is the subject of a complex and emerging body of social science research (Fussell et al. 2014, Findlay 2011, McLeman and Hunter 2010, McLeman and Smit 2006). To help stimulate and inform research, and to provide guidance to decision makers on this issue, researchers

## **Box 1.** Climate Refugee, or Climate Migrant?

Although the term “climate refugee” is often used to describe an individual experiencing forced or voluntary displacement as a result of climate change, there is currently no internationally recognized *legal* definition for “climate refugee,” nor is there a legal mechanism for obtaining climate refugee status.

Recognizing this, we use the term “climate migrant” to describe an individual who moves—either voluntarily or involuntarily—in response to environmental stress. This is consistent with population dynamics scholarship and avoids confusion with refugees protected under the 1951 United Nations Refugee Convention.<sup>2</sup>

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<sup>1</sup> See, for example, “Climate Refugees are Coming to the Pacific Northwest.” *Crosscut*, 16 Sept. 2014. 14 Feb. 2015; “What do you get if you map the coming climate disasters? Hello, Pacific Northwest”, *L.A. Times*, 29 Dec. 2014)

<sup>2</sup> According to the 1951 U.N. Refugee Convention, a refugee is “An individual who is outside his or her country of origin due to a well-founded fear of persecution based on race, religion, nationality, social group or political



at Portland State University and the University of Washington Climate Impacts Group convened experts in climate science, population dynamics, and public sector management to begin addressing the following central question:

Do we need to be planning for more growth in Washington and Oregon because of climate change, and if so, what would a systematic framework for developing and updating migration scenarios for use in regional and state population growth and planning forecasts look like?

The symposium—the first of its kind in the region and possibly the first of its kind in the United States—was held on June 24, 2016 at Portland State University.

## Symposium Goals and Structure

To specifically address the symposium’s central question, “Winds of Change” was organized as two separate but complimentary events designed to achieve the following goals:

1. **Address** the immediate need, as expressed by decision makers, for expert-based guidance on what we can currently say about the potential for climate change-driven migration and its relevance to today’s long-range planning decisions.
2. **Enhance** regional understanding of how climate change could influence migration and population dynamics in Washington and Oregon, including the Seattle and Portland metropolitan areas.
3. **Increase** cross-disciplinary understanding of population forecast methodology and climate impacts science, and use the perspectives, information, and tools that each discipline brings to develop a more thorough understanding of the potential for climate change-driven migration to Washington and Oregon.
4. **Identify** key information and research needs for furthering our understanding of climate change-driven migration in Washington and Oregon, and for developing a systematic framework to create and update migration scenarios for use in regional and state population growth and planning forecasts.
5. **Stimulate** research on the climate change-driven migration question and its impacts on population forecasting and long-range planning in Washington and Oregon.

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opinion who is unable to, or owing to such a fear, unwilling to avail him- or herself of the protection of that country.”

The first part of the symposium featured a public plenary session that provided an overview of what we currently know about migration trends, including the role of climate in influencing past and current migration patterns, and implications, if any, for future migration trends. Approximately 135 people attended the morning public plenary session.

The second part of the symposium was an afternoon invitation-only work session. The afternoon session built on the morning public plenary to discuss the specific information and research needed to help answer questions about the potential for climate change-driven migration to Washington and Oregon. Afternoon session participants included demographers, researchers, and public sector decision makers whose decisions are affected by long-term population projections. More than 40 people attended the afternoon work session. The symposium agenda is included in Appendix A.



The Symposium's morning public plenary session. *©Nina Johnson Photography.*

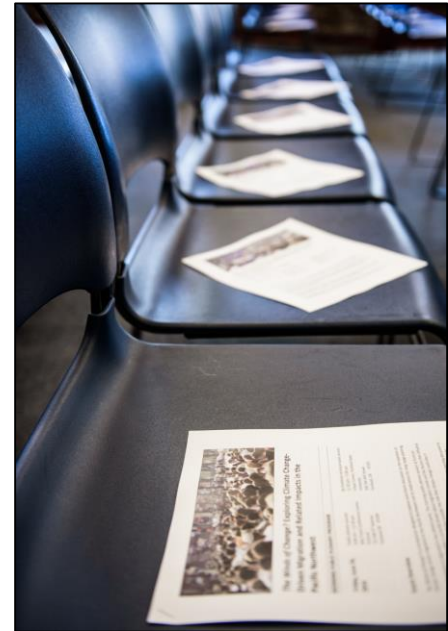


# Morning Presentations

## Summary and Key Points

The morning public plenary session was anchored by presentations from three invited speakers with expertise in international and domestic migration, and the role of environmental conditions in shaping human behavior.

The first speaker, Dr. Jose Miguel Guzman of ICF International, has worked on issues related to population dynamics and linkages with health, environment, and poverty for more than 20 years. While working for the United Nations Population Fund (UNFPA), Dr. Guzman partnered with academics and policy specialists to pioneer research exploring the implications of climate change on urbanization trends. In his current role at ICF, Dr. Guzman is helping countries address health and population change data needs relevant to climate change adaptation. Dr. Guzman was asked to provide an international perspective on climate change and migration, including direct insight on what we can learn from migration trends and resilience efforts in large cities in the Global South.



Symposium programs. ©Nina Johnson Photography.

The second speaker was Dr. David Plane, Professor in the School of Geography and Development at the University of Arizona. Dr. Plane was invited given his extensive knowledge around the voluntary and involuntary dynamics and drivers of mobility and migration, as well as his expertise regarding methods and models of population forecasting. Dr. Plane was asked to address domestic migration patterns and trends, and the factors that influence migration, with specific attention to migration patterns in the Pacific Northwest.

Dr. Robert McLeman, Associate Professor in the Department of Geography & Environmental Studies at Wilfrid Laurier University, was the third invited plenary speaker. Dr. McLeman, who has published extensively on the impacts of climate change on livelihoods and migration patterns, was invited because of his interdisciplinary research approach connecting climate factors and human mobility. Dr. McLeman was asked to discuss how climate change is likely to influence human migration behavior, including what has been learned from past migration events.

## Presentation 1: Jose Miguel Guzman, ICF International

### *Migration, Urbanization, and Climate Change Adaptation: Facts and Challenges*

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*Key points from Dr. Guzman's presentation:*

- Migration has always been a tool for adaptation, although not necessarily the tool of first resort.
  - Certain sub-groups will be better able to cope with climate change than others because of access to resources or other factors. The presence of inequalities is an important concept for understanding how individuals consider migration as an option for mitigating environmental risk.
  - Urbanization trends, particularly in developing countries, underscores the importance of looking at adaptation in developing countries and in cities when thinking about the question of climate change and migration. Their experiences can inform comprehensive urban planning.
- 

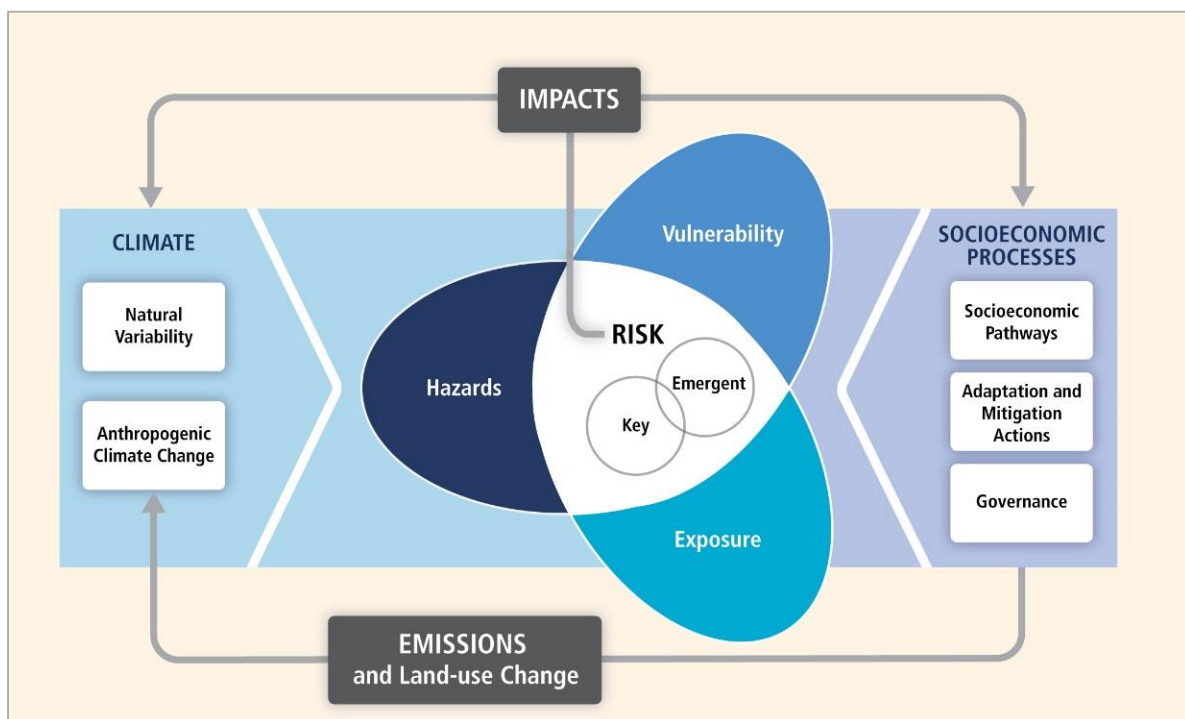
Dr. Guzman began his presentation by drawing an important contrast between climate change mitigation and adaptation. According to Dr. Guzman, the imperative for reducing greenhouse gases is generally well recognized and, for the most part, well understood. This is not the case for adaptation; what is specifically required to successfully adapt to climate change is still relatively unknown. Regardless, people will adapt using the knowledge, tools, and resources that they already have. Migration is (and always has been) one of the tools for adaptation, but migration historically was not always the tool of first resort given peoples' existing connections to their homes and communities.

Dr. Guzman noted that there is increased focus internationally on how climate change affects human systems. This has contributed to the development of a more complex and multi-dimensional way of framing climate change risks (Figure 1) and impacts on people (Figure 2) that takes into account the varied social, political, and economic factors that can create disproportionate risks across populations. In the end, this intersectionality underscores the complex, sometimes unpredictable, and compelling research challenges of climate change-driven migration.

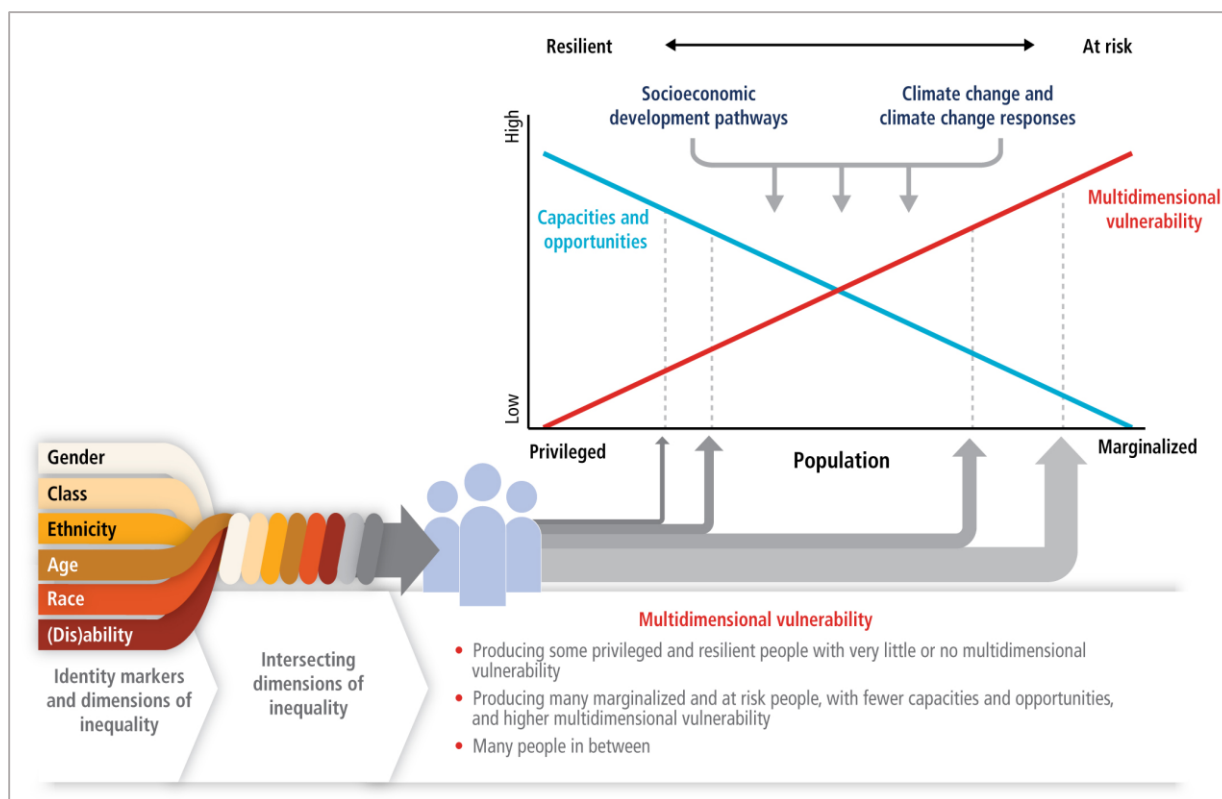
When it comes to the issue of migration, the tendency to migrate not only depends on the severity and duration of the climate hazard, but also on how vulnerable individuals are to the climate hazard. Certain sub-groups will be better able to cope with climate change than others because of access to resources or other factors that help limit the impacts of climate change on an individual or group; those individuals may be able to adapt in place and therefore are less likely to see migration as a necessary or preferred course of action. On the other hand, sub-

groups with few resources may become “trapped migrants”, or people who want to migrate but cannot. The presence of these inequalities is an important concept for understanding how individuals consider migration compared to other pathways for mitigating environmental risk.

Inequality is most prominent and visible across cities in developing countries; many cities are on the front line of confronting effects of climate change, often with limited infrastructure. Here, profound demographic growth challenges (e.g., populations doubling every 10-15 years), age distribution (e.g., these areas tend to have a larger proportion of young people, who are more likely to migrate), and rapid urbanization (e.g., more than 90 percent of the population growth projected through 2050 is expected to happen in cities) means that when we talk about adaptation to climate change and the question of migration, we need to talk about adaptation in these regions and in cities. In the end, the experience of cities in developing countries not only underscores the challenges of climate change-driven migration, but can also inform comprehensive urban planning practice.



**Figure 1.** Core related risk concepts of the Intergovernmental Panel on Climate Change (IPCC), Working Group II, Fifth Assessment Report (IPCC 2014).



**Figure 2.** Concepts and dimensions of multidimensional vulnerability, Intergovernmental Panel on Climate Change (IPCC), Working Group II, Fifth Assessment Report (IPCC 2014).

Dr. Guzman closed his presentation by summarizing what he sees as important research and policy challenges associated with climate change-driven migration. For research, addressing these challenges will likely require exploring and investing in more complex demographic modeling (e.g., structural models) that incorporates climate and political decision making, for example. Pursuing and implementing new data sources (i.e., “big data”) will also improve analysis and projections of future population trends.

From the policy side, we need to recognize that the poorest people and the poorest countries will suffer disproportionately under climate change; that inequalities affect the ability to generated sustainable changes; and that barriers to migration exist at multiple levels. At the same time, this is not the first time humans have had to adapt. Urbanization creates a space and rich opportunities for adaptation; access to technology and data is better than ever; people are more educated than in the past; and changes in age structure in places like Europe may ultimately require young migrants to fill out the workforce, changing the conversation around migration. There is a need, Dr. Guzman concluded, to look at migration in the broader perspective as an option, and not as a tragedy.

## Presentation 2: David A. Plane, University of Arizona

### *Migration Patterns Today and The Factors That Influence Them*

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*Key points from Dr. Plane's presentation:*

- Two important trends that need to be considered in future U.S. population forecasts are continued changes in global climate and aging of the U.S. population.
  - In addition to the push-pull factors that influence migration, migration is also heavily influenced by age and stage of life course. How this age schedule translates into population trends and community age structure will vary by location.
  - Future research must explore how perceptions of climate change threats vary across age and other individual migrant characteristics.
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Population projections for a given location are developed by balancing births, deaths, and net migration, which is the net sum of both in- and out-migration. Compared to births and deaths, migration is often the largest and most difficult process of demographic change to predict at the local and regional scale. Producing accurate and reliable population forecasts/projections<sup>3</sup> therefore requires collecting data points that are good predictors of future trends.

Two important trends that need to be considered in future U.S. population forecasts, Dr. Plane advocated, are continued changes in global climate and aging of the U.S. population. Given that climate change is still an emerging issue in population projections research, Dr. Plane suggested that age is a paramount variable for understanding migration and for thinking about the linkages between climate change and U.S. regional/local migration patterns.

Relying on various research approaches,<sup>4</sup> migration scholars often conceptualize reasons for migrating in a “push-pull” theoretical framework. Push factors—negative aspects at the migrant’s origin—often include lack of economic opportunity, wars (refugee movement), family issues, dissatisfaction with housing costs, cost of living, and natural disasters. Alternatively, pull factors—positive (perceived) aspects at the migrant’s destination—often include economic opportunity, lower living costs, family ties, and a better climate.

In addition to the push-pull factors, migration is also heavily influenced by age and stage of life course. To help illustrate this point, Dr. Plane walked the audience through the “migration age schedule” (Figure 3). Research shows that peak mobility occurs in the late teens/early 20s, a

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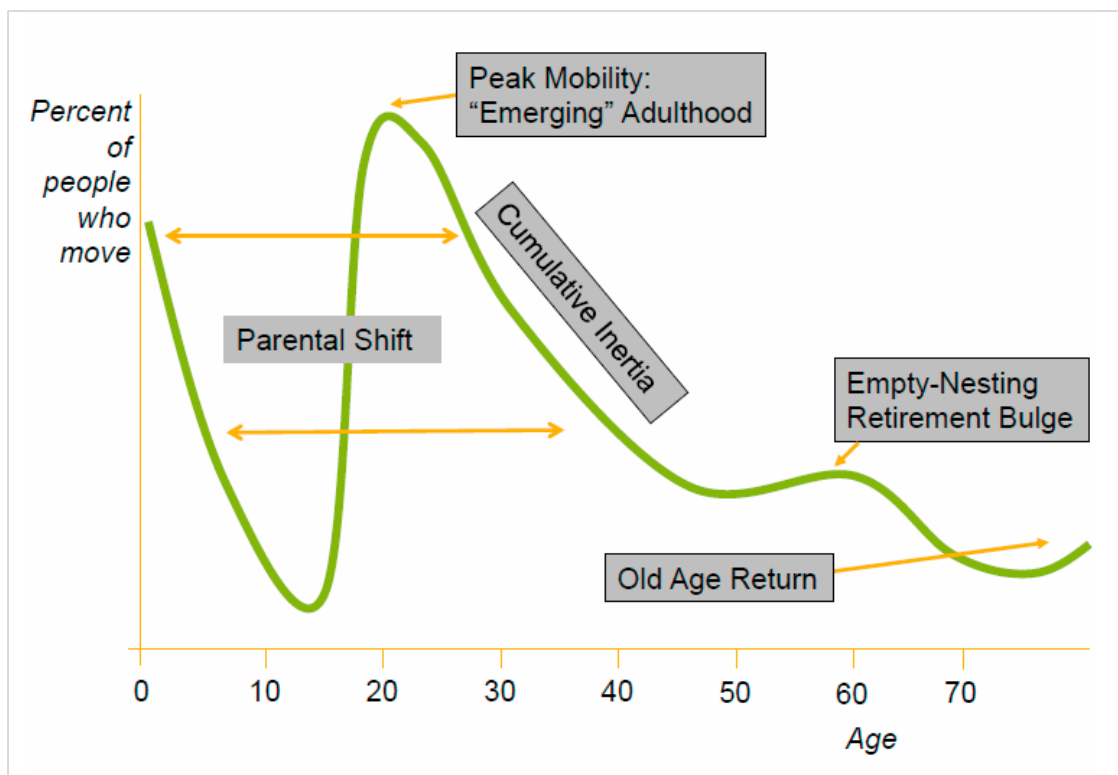
<sup>3</sup> According to Smith et al. (2002), a *population projection* represents a mechanical extrapolation of trends given a set of specified assumptions while a *population forecast* is the set of projections deemed most likely to occur.

<sup>4</sup> In his plenary presentation, Dr. Plane distinguishes between the two dominant approaches in migration research: 1) individual/behavioral and, 2) aggregate/geographical. See the presentation for more details.



period known as “emerging adulthood.” As young adults settle down (mid-20s through early 50s), the percent of people who move in those age groups declines. Smaller secondary increases occur as people enter their 50s and early 60s (the empty nest, pre-retirement bulge) and late in life as elderly individuals move back to where family is located.

How this age schedule translates into population trends and community age structure will vary by location. For example, the flow of migrants between State College, Pennsylvania (home of Penn State University) and New York City will look very different (and much younger) than the migration age patterns found between New York City and Sarasota, Florida. Furthermore, research shows that retirees tend to move to smaller towns while younger people are looking for urban amenities, contributing to growth trends in metropolitan areas and urban cores. In the end, given that age determines both the likelihood and underlying mix of reasons driving people to move, future research must explore how perceptions of climate change threats vary across age and other individual migrant characteristics.



**Figure 3.** The Migration Age Schedule. Mobility varies with age, as indicated (qualitatively) by the change in the percent of people who by age. “Parental shift” refers to the fact that mobility at young ages is a function of parental movement. Figure source: Dr. David Plane, University of Arizona.

In the United States, like many other areas of the developed world, urban cores are growing rapidly. Driven by density, public transportation, and access to urban and cultural amenities, downtown areas are attracting young residents in considerable numbers, including Portland and Seattle, which recorded the 6<sup>th</sup> (14,857) and 9<sup>th</sup> (14,006) highest absolute change in downtown population growth during 2000-2010.<sup>5</sup> If core urban areas are to maintain this strong growth, they will need policy and other tools to maximize the use of available land and opportunities to densify. Future growth may otherwise shift toward suburban and exurban settings. This has implications for climate change as public officials consider transportation and housing needs. To comprehensively plan for future growth, cities/regions need to incorporate comprehensive public transportation services and dense housing development in a more environmentally sustainable way.

Dr. Plane closed by inviting the audience to explore the US EPA's Integrated Climate and Land Use Scenarios data sets ([www.epa.gov/iclus](http://www.epa.gov/iclus)), which provide spatially explicit projections of population, housing density, and impervious surface projections at a 90m x 90m grid out to 2100 for different greenhouse gas emission scenarios.

### Presentation 3: Robert McLeman, Wilfrid Laurier University

#### *What Does Current Research Tell Us About How Climate Change Affects Migration Factors?*

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*Key points from Dr. McLeman's presentation:*

- Survey design and data collection issues are particularly important for advancing our future understanding of environmental-related migration.
  - A useful approach for understanding environmental-driven migration is "MESA", where the potential for migration due to environmental concerns (M) is a function of the physical nature of environmental risk (E), sensitivity of livelihoods and socioeconomic well-being to the environmental risk in question (S), and options for adapting other than migration (A).
  - Climate change will most likely increase the number of people migrating to the Northwest but that migration will not occur overnight and will likely occur in migration pulses similar to what Portland and other areas have experienced in the past.
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Dr. McLeman's presentation focused on the more subtle influence that environment and climate have on the factors that influence migration, which he summarized as lifestyle preferences, love (i.e., family and social networks), money (i.e., economic opportunity), and survival. In some cases, the environmental/climatic influence on these factors is very clear. For example, the number of Hondurans intercepted at the U.S. border by the U.S. Immigration and

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<sup>5</sup> For more information, see: <http://www.census.gov/population/metro/data/c2010sr-01patterns.html>

Naturalization Service increased notably in the 6 to 12 months following Hurricane Mitch, which caused extensive damage in Honduras in 1998.

In other cases, that influence is harder to detect, due in part to how census and other demographic statistics are collected. For example, research conducted by Dr. McLeman and colleagues found that pollution and pollution-related health impacts (e.g., asthma), food insecurity, and other environmental concerns have been important factors contributing to legal immigration into Canada from Bangladesh. Documentation of these factors is often missed given how demographic surveys are structured (they typically do not ask individuals about environmental hazards). According to Dr. McLeman, survey design and data collection issues are particularly important for advancing our future understanding of environmental-related migration.

There are five principles of environmental-driven migration that are well understood, noted Dr. McLeman. First, most migration takes place within a country; only an estimated 20 percent of global migration involves crossing borders. Second, when migration does cross borders, that migration is most often to neighboring countries. Third, most migrants are young adults of working age (principally because they are the most mobile). Fourth, movements tend to follow existing migration networks (i.e., chain migration). Finally, migration flows most often from rural areas to urban centers and from smaller centers to larger ones.

Existing research also tells us that there are different migration consequences depending on how quickly (or how slowly) an environmental event occurs. After a rapid-onset natural disaster (e.g., Hurricane Katrina), a rapid pulse of out-migration ensues, followed by a “churn” of people moving in and out of the affected area in search of labor market opportunities. More gradual disasters (e.g., drought) generate slower and more predictable migration patterns. According to Dr. McLeman, a useful approach for understanding environmental-driven migration is “MESA”, where the potential for **migration** due to environmental concerns (M) is a function of the physical nature of **environmental** risk (E), the **sensitivity** of livelihoods and socioeconomic well-being to the environmental risk in question (S), and options for **adapting** other than migration (A).

Dr. McLeman closed by noting his expectation that climate change will most likely will increase the number of people migrating to the Northwest but that migration will not occur overnight and will likely occur in migration pulses similar to what Portland and other areas have experienced in the past. How many more people depends on how bad climate impacts are elsewhere.

Appropriate steps for comprehensive planning include: 1) knowing existing migration in-flows, 2) understanding climate-related vulnerabilities in migrant source areas, 3) understanding and reducing your own local climate-related vulnerabilities; and 4) building capacity and flexibility into planning to adapt for varied migrant characteristics. Dr. McLeman also emphasized the importance of protecting local water supplies and sustainability planning. Moving climate change and climate-related migration planning into a comprehensive planning system will ensure that these considerations are included in all decisions moving forward.

## Panel Discussion

*Jose Miguel Guzman, ICF; David A. Plane, University of Arizona; Robert McLeman, Wilfrid Laurier University; Tom Armstrong, City of Portland; Crystal Raymond, Seattle City Light; Philip Mote, Oregon State University*

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*Key points from the panel discussion:*

- Climate change adds another dimension to the challenge of interpreting long-term trends in population or other factors for planning purposes. Knowing the characteristics of migrants coming to the region could matter as much as the volume of migration.
  - Building flexibility to accommodate the uncertainty around future population growth will be needed, however building in that flexibility (e.g., by planning for the highest population projections) can be a challenge, particularly given how infrastructure is financed and built.
  - While there is no need to be alarmed by the potential for climate change-driven migration, it is also important not to ignore the issue. The research community and practitioners should start collecting data as best we can and start thinking through the different dimensions of the issue.
- 

The morning plenary concluded with a panel discussion featuring the symposium's invited guest speakers and representatives from the public sector and climate science community. Panelists were first asked to discuss the extent to which the question of climate change-driven migration is coming up in their work, and the issues the question is raising. Panelists were then asked to reflect on the morning discussions and identify ideas or information they thought important to advancing our understanding of the potential implications of climate-driven migration. The session concluded with questions from the audience.

The panel discussion surfaced a number of insightful thoughts, observations, and questions. One issue raised by multiple panelists was uncertainty in how to interpret long-term trends in population or other factors for planning purposes. People often assume that in-migration trends will continue and even accelerate, particularly in places that are growing. In actuality however, there is some degree of uncertainty about the permanence in the volume,

directionality, and composition of current migration flows. First, research shows that almost as many people leave a place (even if only to move to an adjoining metro area) as arrive, and it is unclear at this point if in-migrants will stay in Portland and Seattle or move on to other locations. Second, an aging population may also affect long-term trends. Millennials are now aging out of a period of higher mobility, suggesting that Portland and Seattle's market segment for in-migration could be on the decline. At the same time, the Baby Boomer generation (which is a smaller demographic group than the Millennials) is retiring and becoming more mobile.

Climate change adds another dimension to the challenge of interpreting trends. Ms. Raymond noted that electric demand from Seattle City Light's customer base has been declining over time—despite population growth—due to increased energy efficiency. The potential for climate change-driven migration, coupled with climate change impacts on seasonal power demand, complicates the idea of simply extrapolating long-term usage trends for planning purposes. What's more, the characteristics of individual migrants could matter as much as the volume of migration for City Light. For example, if people are coming from areas accustomed to air conditioning, they may bring that demand for air conditioning with them. If people migrating to the region are low income, City Light's support programs for low-income residents could be affected.

Panelists also discussed the potential effect of climate shocks on population movement and how climate impacts (depending on their severity and frequency) could challenge the long-established theory that past population trends are generally a good indicator of future trends. There is a tendency to assume that changes will happen over time and that people will make the decision to migrate in a smooth process. However, research on migration shows that big climate shocks can create new migration patterns that become more widespread over time. We need to consider the probability that something more sudden could happen (such as a major hurricane) and cause people to move, but this will not be easy to predict in advance.

At the same time, Dr. McLeman noted a degree of skepticism about media reports of how climate change is going to cause hundreds of millions of people to migrate and become environmental refugees. These studies are often based on general assessments of the number of people exposed to climatic risks (e.g., the number of people living within three feet of sea level) and the assumption that they will all have to move. As pointed out in the morning presentations, sensitivity and adaptive capacity have to be taken into account as well.

Whether the population migration is smooth or a shock, Ms. Raymond and Dr. Guzman both felt the morning's conversation underscored the value in knowing where people are coming from. One way of getting at this question is understanding how climate change affects the



regions that have historically served as migration source regions for the Northwest; this work should focus specifically on impacts to factors that induce people to move.

Building flexibility to accommodate the uncertainty around future population growth—a point made earlier in the day—will also be needed. Ms. Raymond and Mr. Armstrong both noted that building in that flexibility (e.g., by planning for the highest population projections) can be a challenge, however, particularly given how infrastructure is financed and built. While population projections are smooth, infrastructure development is stair-stepped, requiring large capital investments up front. Building infrastructure based on the biggest population projections has a cost that would have to be passed on to a community. There has to be a balance between increasing flexibility to account for uncertainty and the costs associated with those choices.

The importance of understanding the magnitude of climate change-driven migration, relative to the growth that would otherwise be expected, was also noted. If you were to model future population with a static climate and then repeat that modeling with a climate that includes more extreme events, would the difference in migration be significant enough to warrant changing the way organizations currently model future population and demand for services?

Dr. McLeman emphasized that while there is no need to be alarmed by the potential for climate change-driven migration, it is also important not to ignore the issue. “Climate change is not going to go away,” he noted. The research community and practitioners should start collecting data as best we can and start thinking through the different dimensions of the issue with a 10- to 25-year time horizon in mind (beyond 25 years, he suggested, is harder and probably doesn’t help). While we can’t make predictions with the current tools, we can make “good intelligent guestimates” at this point, Dr. McLeman concluded.



**Panel members (left to right):** Crystal Raymond, Seattle City Light; Jose Miguel Guzman, ICF; Tom Armstrong, City of Portland; David A. Plane, University of Arizona; Philip Mote, Oregon State University; and Robert McLeman, Wilfrid Laurier University. ©Nina Johnson Photography.

# Afternoon Work Session

## Summary and Key Points

The afternoon session featured a by-invitation-only discussion and work session for demographers/population geographers, climate change researchers, urban/regional planners, and public sector decision makers working in Seattle and Portland. These individuals, who develop, use, or are directly affected by long-term population projections, were asked to reflect on what they learned from the morning plenary session and to discuss the following questions:

1. **Is there need for (and value in) developing a “climate migration factor” for demographic projections now, or is it premature at this point?** i.e., are you comfortable with the current level of information and understanding of climate change-driven migration, and/or is additional research necessary to explore this issue further?
2. **How do demographers and practitioners deal with or think about climate uncertainties embedded in current demographic projections?** How accurate are current projections, how (if at all) are climate impacts included in those projections, and how comfortable are you with making decisions based on current projections?
3. **At what level of impact would climate-related population changes (specifically, migration) really start to matter and need to be explicitly identified?** In other words, (1) how fast does population growth have to be for it to be challenging to manage/accommodate (or for it to require a significant change in approach)?, and (2) How much faster than *projected* growth does actual population growth have to be to cause challenges?
4. **What *additional* information and research is needed** to better understand the potential for, and the impacts of, climate impacts on migration to the Pacific Northwest?
5. What **specific topics would you like to see discussed** in subsequent workshop(s) to move the research agenda and knowledge base forward on this topic?

Facilitation services were provided by Steve Greenwood and his team from Oregon Solutions<sup>6</sup> to help ensure collective engagement and fruitful discussion around these questions.

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<sup>6</sup> A research center in the College of Urban and Public Affairs (CUPA) at Portland State University, Oregon Solutions convenes stakeholders in communities across the Northwest, and nationally, to collaboratively address problems

## Discussion Results

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- 1. Is there need for (and value in) developing a “climate migration factor” for demographic projections now, or is it premature at this point?** i.e., are you comfortable with the current level of information and understanding of climate change-driven migration, with the understanding that additional research might be necessary to explore this issue further?
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Work session participants generally agreed that it would be premature to develop a “climate migration factor” for population projections. While many participants reported that questions about climate change-driven migration are being asked by policymakers and members of the public with increasing frequency, many also thought that climate change impacts on population dynamics may take more time to emerge at a scale with material effects. As a result, most individuals felt that the current population projections are presumably adequate.

Participants felt that it was both important and more appropriate at this point to start framing the additional data, information, methodologies, and modeling needs (i.e., research needs) required to assess when and if such a factor should be incorporated into population forecasting for Washington and Oregon. The emphasis in the near term, according to work session participants, should be on developing a better understanding of the issues and support for strategic level thinking rather than on developing climate change-driven population projections. Being proactive on the issue would help avoid the potential of getting “bogged down in idle speculation”, according to one participant, or “fearmongering”, according to another. Being proactive is also something of a necessity given that it may take the research community 10-15 years to sufficiently develop the understanding, models, and tools necessary for identifying, quantifying, and projecting climate change-driven migration. If and when climate migration scenarios are needed for demographic projections, it will be important that the information and methodology is tied into “tried-and-true” demographic models.

Participants also emphasized the need to make sure that future research on this topic recognize and help connect climate impacts to the variety of other social, economic, and demographic factors underlying migration behavior. Assuming a single cause-and-effect relationship between climate and migration—a common assumption in public speculation on this topic—is not supported by academic research and therefore should not be the default basis for any future migration projections. While there was some degree of skepticism expressed about the ability to successfully untangle all of the factors at play, one group underscored the need to know who

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and opportunities. Recent examples include Oregon’s urban-rural divide, water conflicts in Eastern Oregon, and Columbia River sediment management. For more information, see: <http://orsolutions.org/>.

is most likely to be affected by climate impacts, and what types of services they might need as a result of being more vulnerable.

Participants identified scenario planning as a potentially valuable tool for developing a “climate migration factor.” Scenario planning could help decision makers and researchers see what matters for migration outcomes even as researchers and demographers work on refining predictive models. Participants pointed to the importance of looking at other parts of the world as a guide for how population projections are developed and the types of scenarios they include.

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**2. How do demographers and practitioners deal with or think about climate uncertainties embedded in current demographic projections?** How accurate are current projections, how (if at all) are climate impacts included in those projections, and how comfortable are you with making decisions based on the current projections?

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As with climate projections, the range of uncertainty in population projections, and how important that range is, varies according to the decisions being made with the information and how flexible the decisions are to different outcomes (i.e., what you are projecting for). For example, planning outcomes for housing or job market growth are generally more flexible than capital infrastructure (e.g., roads and water supply systems) and therefore better able to absorb a higher-than-expected growth rate. As a result, the level of certainty required in population projections for housing or employment policy and planning decisions is generally less than what may be needed for capital infrastructure, which will be more sensitive to capacity limits.

Another factor that influences the range of uncertainty is the time horizon of the projections (e.g., 5-year versus 25-year projections). As noted by one participant, the degree of uncertainty in short-term projections is relatively low so demographers are more comfortable, and often more accountable, for short-term population projections. Longer-term investments (e.g., transportation planning), on the other hand, need longer-range projections; in these cases, contextualizing the degree and sources of uncertainty starts to matter more.

Finally, the spatial scale of population projections can influence the range of uncertainty. Because the data inputs are generally more reliable for larger geographies, demographers are generally more comfortable producing population projections for states, for example, but less certain about developing population projections at smaller scales (e.g., population projection at the neighborhood level). One participant noted that the regional scale is what is most important for most long-term decisions.

The discussion underscored that uncertainty is an unavoidable reality of population projections. Users' tolerance of uncertainty directly influences, and largely determines, how reliable the population projection needs to be and with that, the need for climate change-driven migration scenarios. As such, the willingness to act on various scenarios will vary between users and according to the sensitivity of different types of decisions being made.

Strategies for dealing with uncertainty in population projections vary. Updating projections on a regular basis allows both the producers and users of population projections to revisit and potentially mitigate areas of uncertainty. Decision makers will also use current trends to inform or adjust choices about "the number" used in planning. For example, one organization represented at the work session selected a population projection slightly above the most likely projection for planning purposes because of current population growth in the region. Scenario development and modeling the impact of different demographics is another useful tool.

There was some discussion around if and how much the uncertainty within current population projections already covers any changes that would be driven by climate change, or the degree to which existing population forecasting inputs will start to include climate impacts. For example, if economic forecasts used to develop regional population projections take climate change into account, a climate change factor would inherently become integrated into the regional projections. It is not clear if climate change is being factored into those models at this point, however.

One participant challenged the demography and research communities to push the boundaries on how projections are made, suggesting that past frameworks might not work for explaining future trends. With the advent of big data, we can obtain (and model) information in real time rather than waiting for small-area data from the decennial census. The question at this point is whether that real time capability is there.

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**3. At what level of impact would climate-related population changes (specifically, migration) really start to matter and need to be explicitly identified?** In other words, (1) how fast does population growth have to be for it to be challenging to manage/accommodate (or for it to require a significant change in approach)?, and (2) How much faster than *projected* growth does actual population growth have to be to cause challenges?

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Views on *when* the question of climate change-driven migration starts to matter were mixed and tended to generate more questions than answers. While the question sought to identify time or magnitude of change thresholds that could serve as tipping points for more explicit inclusion of climate change-driven migration in population projections and planning,



participants suggested that the “who” matters more than the amount. For example, environmental migration that involves more vulnerable populations (e.g., via a Hurricane Katrina-like event) creates a higher degree of urgency and impact on services than voluntary migration of more economically advantaged populations. One participant noted, however, that agencies cannot plan effectively for outlier or dramatic events; they need to plan for trends. Age distribution could also have differential planning implications. A large influx of young adults for example, would have greater impact on school districts while an influx of aging adults would increase hospital and healthcare use.

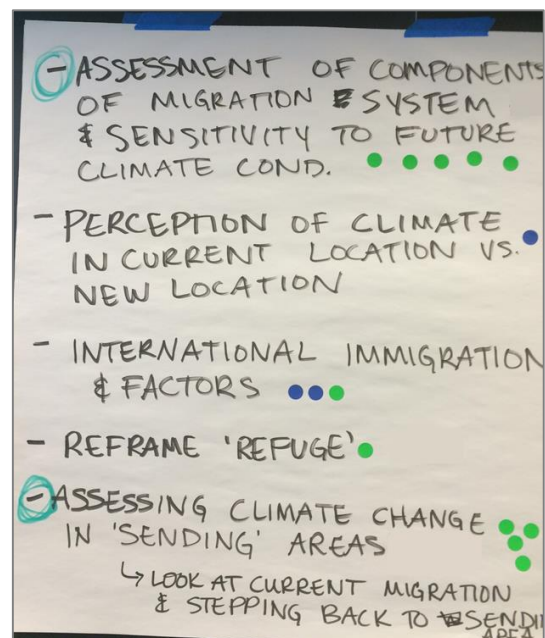
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#### 4. What additional information and research is needed to better understand the potential for, and the impacts of, climate impacts on migration to the Pacific Northwest?

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After working in breakout groups for Questions 1-3, participants reconvened as a group to identify and prioritize research and information needs. Suggestions were listed on flip charts and posted at the front of the room. Participants were then asked to prioritize the suggestions as either short-term or longer-term priorities using stickers to denote their preferences (Figure 4). A recommendation was considered top ranking if it received four or more green (for short-term) or blue (for longer-term) dots.

No specific timeframes were provided to define short-term and longer-term. The top ranking results of this exercise are summarized in Table 1. See Appendix B for complete listing of the results.



**Figure 4.** Example of prioritization exercise.  
*Photo: UW Climate Impacts Group.*

Several over-arching themes emerged from the list of research priorities. The first was a clear interest in enhancing population forecast tools to be more sensitive to the effects of climate on migration, including relevance to “push” factors. This interest is reflected in the variety of suggested priorities aimed at improving the information used directly and indirectly in population forecasting. A second theme was developing a better understanding of when major shifts in migration might occur. This objective would be accomplished by improving monitoring and detection of trends as well as identification of potential migration tipping points. A third theme was supporting near-term information needs through the development of case studies and communications materials.

**Table 1.** Top ranking short-term and longer-term research and information priorities, as identified by afternoon work session participants. See Appendix B for a complete list of recommendations.

Top Ranking Short-term Research Priorities	Top Ranking Longer-term Research Priorities
<ol style="list-style-type: none"> <li>1. Develop case studies of other long-term migrations (e.g., a case study on Houston – what were they planning for and how did Hurricane Katrina affect that?)</li> <li>2. Develop materials to help communicate what we currently know about climate change-driven migration (to refocus the narrative that has taken root).</li> <li>3. Evaluate potential changes in the diversity of migration flows (e.g., who is migrating and how does that act as a forcing factor for other planning considerations?)</li> <li>4. Assess the different components of existing migration systems (e.g., people moving from rural to urban areas) and how sensitive these components might be to climate change.</li> <li>5. Develop a better understanding of climate change impacts in “sending” areas (i.e., migrant origins), and the economic sensitivity of these areas to climate change impacts.</li> </ol>	<ol style="list-style-type: none"> <li>1. Develop more and/or better linkages among various data sets to allow for better tracking of migration patterns over time (e.g., migrants move to Seattle, then out to the county).</li> <li>2. Identify what could be monitored to provide early warning of significant shifts in migration (i.e., are there indicators that could be tracked?).</li> <li>3. Investigate the potential for migration tipping points (e.g., are there frequency/duration/intensity thresholds for heat, drought, floods, or other climate-related variables that could trigger a surge in migration?)</li> <li>4. Evaluate the regional employment implications of climate policy, technology, and innovation. Is there potential for deepening inequalities?</li> <li>5. Gather more qualitative and longitudinal information, asking people why they moved and assessing the degree to which climate impacts those reasons.<sup>7</sup>  (<i>tied</i>) Evaluate whether there are differences in the impact of migration based on socioeconomic status of the migrants.</li> </ol>

<sup>7</sup> One participant noted that it is more important to look at revealed preferences. If you ask people why they move, you have to ask before they move as well as after (i.e., need to ask before they self-justify their move).

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**5. What specific topics would you like to see discussed in subsequent workshop(s) to move the research agenda and knowledge base forward on this topic?**

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The final question of the afternoon work session sought to identify topics that participants would like to see discussed in subsequent meetings or workshops on this topic. Responses included the following:

- Who is doing this type of research and how do we secure funding to further this work?
- What additional actions/efforts are needed to prepare for the “certain uncertainty” of migration?
- What is the best way to engage federal partners on this question?
- How can we get existing data collection tools to start including climate-related influences on peoples’ migration choices?
- When/how do we bring in public health, social and human services, and other programs who have to deal with the climate change-driven migration induced changes in our communities?
- How can we better utilize existing federal data sources to inform research questions?
- How do we start developing a better understanding of the international (i.e., immigrant) climate migration component?
- How does climate change affect economic opportunities and business location choices (i.e., need a closer examination of economics as an important channel affecting migration)?
- What would climate change-driven migration scenarios look like? There is a need to start talking about scenario planning strategies (e.g., what parameters and boundaries?) and specifics to ensure that the scenarios have meaning.

Multiple work session participants also expressed the need to be able to respond to the questions they are being asked by policy makers and the public about the potential for climate change-driven migration. Many endorsed the idea of a fact sheet or related “Frequently Asked Questions” document that participants could share with stakeholders. Symposium organizers committed to developing a short overview document as part of the post-symposium wrap up.

# Final Reflections and Next Steps

The “Winds of Change” symposium was a first-of-its-kind conversation about the potential for climate change-driven migration to the Northwest and its relevance to regional and local planning. The fact that the event’s title started with a question – “Winds of Change?” – was not coincidental. To what extent is climate change-driven migration an issue for communities across the Northwest? What changes might be introduced from climate change-driven migration? And how, and to what extent, should decision makers in Seattle, Portland, and other Northwest communities plan for higher than expected population growth due to climate change?

With these and other related questions in mind, researchers at Portland State University and the University of Washington Climate Impacts Group organized the “Winds of Change” symposium to:

- provide participants an opportunity to learn more about population dynamics and the role of environmental conditions in shaping human behavior,
- assess whether there is a need for (and value in) developing a “climate migration factor” for population projections now or in the future, and
- stimulate cross-disciplinary conversation about key information and research needs for furthering our understanding of climate change-driven migration in Washington and Oregon.

By all measures, the symposium was successful in accomplishing its goals. The event was well-received by participants, stimulated considerable dialogue across a range of disciplines, and helped identify a diverse set of short- and longer-term research and information needs that will guide future work on the issue. Many felt that the research and information needs identified in the symposium could have relevance to other regions wrestling with the same question.

Perhaps most importantly, discussions at the symposium clearly indicated a desire and a need among public sector decision makers to better understand if and how climate change-driven migration may affect existing assumptions about population growth in the region. In the end however, participants signaled that it would be premature to make changes to current population forecasting models. Demographers, researchers, and decision makers should continue to work on identifying the additional data, information, methodologies, and modeling needed to systematically assess the question of climate change-driven migration. This work will

take time to formulate, execute, evaluate, and integrate into demography methods and decision making processes. Because of this, work on these research and information needs should begin now rather than waiting to see if and how climate change affects population dynamics.

More discussion will be needed to further contextualize the questions and ideas raised at the symposium, and to develop a research agenda that will help address the decision maker needs. Symposium organizers are planning additional workshops that focus more specifically on the demographic characteristics of Seattle and Portland to accomplish this task. A fact sheet summarizing what we know (and don't know) about the potential for climate change-driven migration will also be developed in the near term for participant use.

A final takeaway articulated by several participants (most from areas outside of the Pacific Northwest), as well as Dr. McLeman in a recent blog post,<sup>8</sup> called attention to the innovative nature of the symposium. Specifically, individuals remarked on the ability to convene working professionals across industries (e.g., academia and government), disciplines (e.g., population and climate science), and state lines as a testament to the Pacific Northwest's commitment to forward data-driven thinking and planning. While it's important to recognize and celebrate these achievements, we argue it is also important to further strengthen the region's collaborative working relationship; to this end, extending an invitation to our colleagues from Vancouver, BC to participate in future events is an important step forward. Finally, it's important to also further our commitment to equity by ensuring that the potential effects of climate change-driven migration do not fall disproportionately on persons of color and marginalized communities in the Northwest.

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<sup>8</sup> See: <http://thisgeographicallife.blogspot.com/search?updated-max=2016-08-30T04:11:00-11:00&max-results=1>

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# Appendix A – Symposium Agenda

## MORNING PUBLIC PLENARY PROGRAM

8:30 – 9:00 AM	Registration
9:00 – 9:10 AM	<b>Symposium Welcome</b> Introductions by Portland State University President Wim Wiewel and Dean Stephen Percy; Amy Snover, Assistant Dean for the College of the Environment and Director of the Climate Impacts Group, University of Washington
9:10 – 9:50	<b><u>Plenary 1</u></b> <b>Migration, Urbanization and Climate Change Adaptation: Facts and Challenges</b> <i>Jose Miguel Guzman, PhD, ICF International</i>
9:50 – 10:30	<b><u>Plenary 2</u></b> <b>Migration Patterns Today and the Factors that Influence Them</b> <i>David A. Plane, PhD, University of Arizona</i>
10:30-10:50	<i>Break</i>
10:50-11:30	<b><u>Plenary 3</u></b> <b>What Does Current Research Tell Us About How Climate Change Affects Migration Factors?</b> <i>Robert McLeman, PhD, Wilfrid Laurier University</i>
11:30-12:20	<b><u>Plenary 4</u></b> <b>Panel Discussion</b> Facilitated by Jason Jurjevich, PSU <i>Panel members: Jose Miguel Guzman, ICF; David A. Plane, University of Arizona; Robert McLeman, Wilfrid Laurier University; Tom Armstrong, City of Portland; Crystal Raymond, Seattle City Light; Philip Mote, OSU</i>
12:20 – 12:30	<b>Morning Plenary Wrap-up</b>

## AFTERNOON WORK SESSION

12:30-2:00	<b>Lunch @ PSU</b> (invited participants only; travel via Portland streetcar)  1:30-1:45 – Summary of U.S. Climate Change Impacts, <i>Lara Whitely Binder, UW CIG</i> 1:45-1:50 – Overview of research on hurricanes and population movements, <i>Sara Curran, UW</i>
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2:00 – 3:30	<p><b>PM Session 1 - Reflections on the Morning Session</b></p> <ul style="list-style-type: none"> <li>• 2:00-2:10: Re-Introductions</li> <li>• 2:10-2:45: Small-group discussion of questions</li> <li>• 2:45-3:30: Report back/plenary discussion on table conversations</li> </ul> <ol style="list-style-type: none"> <li>1. <b>Is there need for (and value in) developing a climate migration factor for demographic projections now, or is it premature at this point?</b> i.e., are you comfortable with the current level of information and our understanding of climate change-driven migration, with the understanding that additional research might be necessary to explore this issue further?</li> <li>2. <b>How do demographers and practitioners deal with or think about climate uncertainties embedded in current demographic projections?</b> How accurate are current projections, how (if at all) are climate impacts included in those projections, and how comfortable are you with making decisions based on the current projections?</li> <li>3. <b>At what level of impact would climate-related population changes really start to matter and need to be explicitly identified?</b> In other words, (1) how fast does population growth have to be for it to be challenging to manage/accommodate (or for it to require a significant change in approach)?, and (2) How much faster than <i>projected</i> growth does actual population growth have to be to cause challenges?</li> </ol>
3:30-3:45	<i>Break</i>
3:45–4:55	<p><b>PM Session 2 – Moving Forward</b></p> <ol style="list-style-type: none"> <li>4. <b>What <i>additional</i> information and research is needed</b> to better understand the potential for, and the impacts of, climate impacts on migration to the Pacific Northwest region? <ul style="list-style-type: none"> <li>○ Activity: Dot exercise and short-term/long-term prioritization</li> </ul> </li> <li>5. What <b>specific topics would you like to see discussed</b> in subsequent workshop(s) to move the research agenda and knowledge base forward on this topic? (time permitting)</li> </ol> <p>Final Reflections</p>
4:55-5:00	<b>Symposium close</b>

# Appendix B – Prioritization Results

The following is a complete listing of information and research needs identified in the afternoon work session, grouped based on the prioritization results. A recommendation was considered top ranking if it received four or more green (for short-term) or blue (for long-term) dots. No specific timeframes were provided to define short term and long term. In cases where ideas received both short-term and long-term votes, the category that received the most votes determined final placement of the recommendation. In some cases, similar ideas were combined to reduce duplication.

## **Top-ranking short-term research priorities** (4 or more green dots)

- Develop case studies of other long-term migrations (e.g., a case study on Houston – what were they planning for and how did Hurricane Katrina affect that?)
- Develop materials to help communicate what we currently know about climate change-driven migration (to readdress the narrative that has taken root).
- Evaluate potential changes in the diversity of migration flows (e.g., who is migrating and how does that act as a forcing factor for other planning considerations?)
- Assess the different components of existing migration systems (e.g., people moving from rural to urban areas) and how sensitive these components might be to climate change.
- Develop a better understanding of climate change impacts in “sending” areas (i.e., migrant origins), and the economic sensitivity of these areas to climate change impacts.

## **Other short-term recommendations:**

### *Ideas receiving 3 green dots:*

- How do migration responses vary across different hazards?

### *Ideas receiving 2 green dots:*

- More research on why do people move (discussion note: For this question, it’s more important to look at reveal preferences. If you ask why they move, have to ask before they move and then after they move (before they self-justify their move))

- What do the new USEPA Integrated Climate and Land-Use Scenarios projections (<https://www.epa.gov/iclus>) tell us about the region, and do they make sense? (need to dig into the tool more)
- Research on the prevalence of people at risk (and perceptions of risk) due to limited adaptation options and livelihood sensitivity
- More information/research on how policy affects international migration and whether we can expect the same in the future.
- What is the relative magnitude of climate-related migration uncertainty vs. other factors driving migration? Perhaps a comprehensive cross sectional study of demographic projection methods.

*Ideas receiving 1 green dot:*

- If not too late already, need to reframe this question of climate change-induced migration in a way that doesn't say "refugee".

**Top-ranking longer-term priorities** (4 or more blue dots)

- More/better linkages among the various data sets; migrants move to Seattle, then to the county. Need better ways of seeing this.
- What should we monitor for early warning of significant shifts in migration?
- Are there migration tipping points? e.g., are there frequency/duration/intensity thresholds for heat, drought, floods, or other climate-related variables that would potentially trigger a surge in migration?
- What are the regional employment implications of climate policy, technology, and innovation? Is there potential for deepening inequalities?
- Gather more qualitative and longitudinal information, asking people why they moved and assessing the degree to which climate impacts those reasons (note: previous comment about needing to ask people before they move applies here as well)
- Are there differences in the impact of migration based on socioeconomic status of the migrants?

**Other longer-term recommendations:**

*Ideas receiving 2 blue dots:*

- Need to develop a better understanding of the factors that influence international migration (e.g. research into ICE data, or link interviews of international migrants with what we know about climate in their country of origin.)

*Ideas receiving 1 blue dot:*

- What are the perceptions of climate risks between populations that stay and populations that migrate? (i.e., in their current location versus their new location?)

**Additional recommendations** (0 dots in either category)

- More specific data to understand how people react to shocks at the household scale over time.
- What are the expectations of in-migrants when they arrive and how long do they hold on to them? (e.g., do Midwesterners expect to keep their lawns green in the summer and for how long?)
- What is the energy consumption behavior of people migrating to the region?
- What are the mechanisms for new migration pathways? Can we affect their formation?