YEARS ONE & TWO/2016-2017

OUR VISION

Resilient and sustainable Pacific Island communities using climate information to manage risks and support practical decision making about climate variability and change

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The Pacific Regional Integrated Science and Assessment (Pacific RISA) program has recently completed the first two years of Phase 3 projects and research. Pacific RISA conducts interdisciplinary and co-produced climate research that links natural resource managers and decision makers with researchers to produce decision-relevant science. Our team of social and physical scientists and legal researchers works with partners in Hawai‘i and the U.S.-Affiliated Pacific Islands to create and transform climate science into usable, practical, and relevant information.

Phase 3 projects aim to assess the impact of predicted climate variability and change throughout Hawai‘i and the U.S.-Affiliated Pacific Islands, link and communicate mid-range projections with end-of-century downscaled projections, conduct stakeholder inclusive, place-based science to establish sector-relevant decision thresholds,

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and help decision-makers assign different kinds of value to resources across sectors and islands to facilitate choosing adaptation strategies. This grant designates sustained support for communities and research in Hawai‘i, the Commonwealth of the Northern Mariana Islands (CNMI), Guam, Federated States of Micronesia (FSM), Republic of the Marshall Islands (RMI), Republic of Palau, and American Sāmoa.

These projects continue to support the effective utilization of climate science to manage the impacts of the changing climate across diverse sectors in the Pacific Islands region, with four main objectives:

1. Conduct place-based assessment of risk, vulnerabilities, and adaptation strategies;
2. Support implementation of adaptation strategies;
3. Evaluate adaptation plans and policy throughout the region; and
4. Integrate technical climate information and policy outcomes.

New projects that meet the first objective include dynamical seasonal prediction of precipitation for the Hawaiian Islands, a comparative analysis of statistical and dynamical downscaling climate projections, using climate data to estimate recharge and sustainability of freshwater resources in American Sāmoa, and assessing economic impacts of climate change and variability planning and adaptation. To meet the second objective, the team is developing an ecosystem services framework to assess the value of freshwater resources on Maui, continuing work with Maui stakeholders to add decision support options to previous participatory climate scenario work, and creating a regionally relevant set of climate variables and impact indicator variables in different sectors. Objective 3 will be met by conducting evaluations of existing policies and laws for adaptive capacity in different locations and looking back at the effectiveness of previous tools, and analyzing the drivers and impacts of climate-induced human migration. The Pacific RISA has also continued to conduct both internal and external program evaluations with Dr. Suzanne Moser. The fourth objective will be met by identifying Pacific regional climate, socioeconomic and migration variables, and by continuing to improve translation and communication of climate uncertainty in the Pacific Islands.

RESEARCH UPDATES

Dynamical Seasonal Prediction of Precipitation for the Hawaiian Islands

H. Annamalai, Senior Researcher, International Pacific Research Center (IPRC)

While Phase 2 work focused on long-term climate change projections through dynamically downscaled models, stakeholders and Pacific RISA Advisory Committee discussions have suggested that this phase of Pacific RISA should increase research focus on projections of climate variability (El Niño Southern Oscillation, or ENSO, and Pacific Decadal Oscillation, or PDO), and produce a robust comparison of the strengths, weaknesses, and differences between dynamical and statistical downscaled climate projections

Climate scientists use computer models (often requiring supercomputer resources) to predict future climate conditions. A general circulation model (GCM), which divides the land, atmosphere, and ocean systems of the Earth into many equally spaced grids, is employed to project future changes in the climate. Pacific Islands show different climate futures due to their relative size and location, as well as uncertainties related to emissions scenarios and models used. Because of the small relative size and topographical diversity of Pacific Islands, significant downscaling of global model predictions is needed to make them applicable to island-scale decision making. While the continental US has a variety of regionally appropriate downscaled projections to choose from, the Pacific Islands are not included in these national projects.

The main objective for this phase of the research is to perform dynamical (physically based) downscaled projections of precipitation at seasonal to inter-annual timescales (e.g., during different phases of ENSO) at high spatial resolution, starting on the Hawaiian Islands and expanding to US-Affiliated Pacific Islands (USAPI) in later years. The dynamical downscaled seasonal projection component aims to deliver fine-resolution surface temperature and precipitation products (and other variables as desired by the user community) over the Hawaiian Islands.

Dynamical seasonal projection of precipitation over the islands is still in its infancy. Keeping in mind the increasing local demands for reliable and future forecast information at island scales, the team, led by PI Annamalai, focused on the dynamical downscaling of rainfall anomalies during the recent intense ENSO cycle (a strong El Niño followed by La Niña during 2015-2016). Generally, in the near-term and relative to natural internal climate variability, tropical and subtropical areas are expected to warm faster than mid-latitudes. Precipitation changes are less certain and more variable, although regions warming more than the rest of the tropics as a whole tend to exhibit an increase in local precipitation, while regions warming less tend to exhibit reduced precipitation. Figure 1, below, shows historical observed patterns of precipitation anomalies during the winter and spring seasons across the Pacific Island region, in which red areas indicate drier, and blue areas indicate wetter than average conditions. Figure 2 shows the seasonal dynamically downscaled results during the 2015 El Niño event. Reproducing this seasonal precipitation pattern provides a perfect testbed to validate the downscaled model for the region.

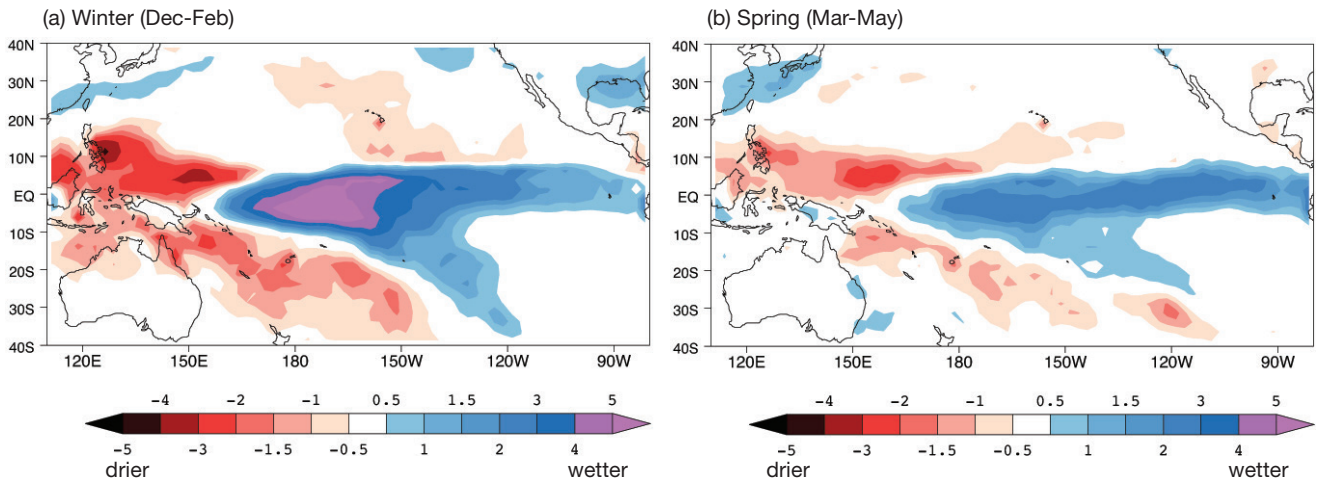

Figure 1: Historical drought and rainfall conditions during past El Niño events.

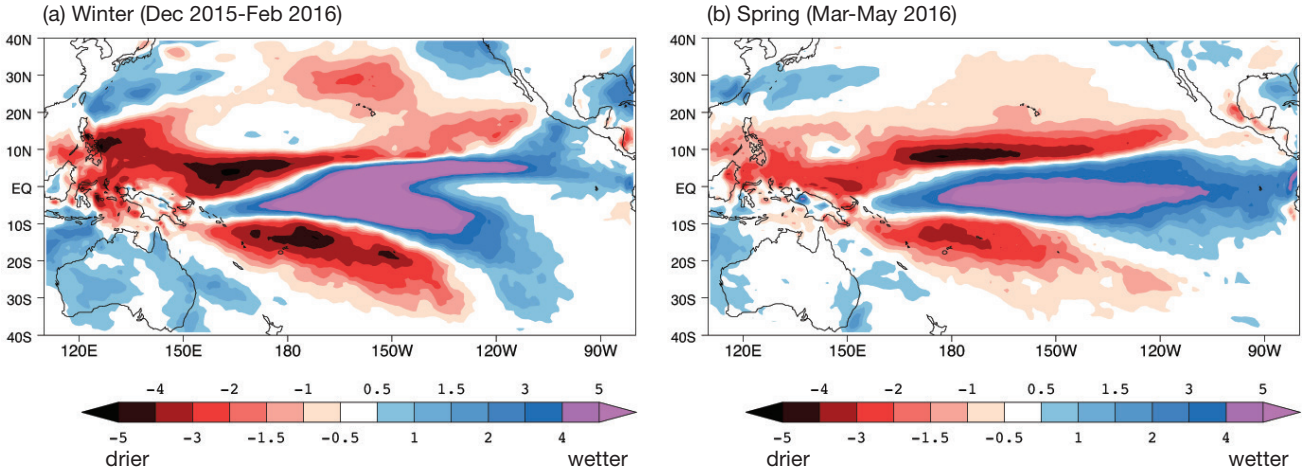

Figure 2: Predicted rainfall and drought conditions for El Niño 2015-2016

Further diagnostics are being performed to validate the model predictions of regional features of rainfall over the Hawaiian Islands. Once the testing is over, the team will employ the system in an "experimental" forecast mode and test other past ENSO events. Once a consolidated system is prepared, they will then begin issuing "real-time experimental forecasts" of seasonal precipitation.

Evaluating Similarities and Differences between Statistical and Dynamical Downscaling Projections

Tom Giambelluca, Professor, Department of Geography, University of Hawai'i

Future rainfall patterns have been projected for the Hawaiian Islands using statistical and dynamical downscaling methods. However, more work needs to be done to test and refine methods in order to produce reliable results. Both statistical and dynamical downscaling methods have inherent uncertainties, which regional stakeholders are grappling with in their efforts to make climate-adaptive decisions. The ultimate goal is to obtain a better understanding of the differences between the existing statistical and dynamical downscaling results, which show substantial disagreement in the magnitude of the projected rainfall changes as well as the signal in the future rainfall anomalies in different areas.

The primary goal that was addressed by PI Giambelluca was to improve the physical mechanisms behind the statistically downscaled future rainfall change scenarios in Hawai'i. One approach was to apply the same downscaling model used in previous projections and modify the climate change input data. The team found that higher rates of warming in the mid-atmosphere (500hPa) increase the (dry) static stability of the atmosphere in future scenarios over the subtropics. This pattern results in a strong drying trend. It was found that, in particular, moisture transport is responsible for compensating for large drying trend due to changes in atmospheric stability. The transport of moisture increases precipitation in the windward sites; and the balance between these two large-scale climate change signals determines most of the future rainfall anomaly pattern with a very strong drying trend in the leeward sides and neutral or slightly enhanced rainfall increases on the windward sites.

Islands can exhibit a variety of climates and microclimates across very small distances. On the island of O'ahu, wet (**Image 1**, left) and dry (**Image 2**, right) environments can be in close proximity, and must be represented in models of current and future climate (Photos: Victoria Keener)

Perceptions of Climate Needs and Downscaling Data by Intermediate Modelers in Hawai‘i

Victoria Keener, Lead Principal Investigator and Research Fellow

This research project built on insights and needs generated from a survey completed by PI Keener in 2016 to inform the first Application of Climate Downscaling in Hawaiian Islands workshop, which evaluated how existing efforts to generate downscaled climate projections for Hawai‘i were being used by researchers, agencies, and decision makers. Through the survey analysis (n = 65) and workshop, attendees came to the independent conclusion that local “Intermediate Modelers” (IMs) were key to the transformation and communication of climate projections for resource management and decision making. For these purposes, IMs are defined as scientists who use future climate projections as inputs to local impact models, such as terrestrial ecosystem models (e.g., plant communities, native Hawaiian birds), hydrology models, or economic models, among others.

To facilitate discussion at the second downscaling workshop (April 2017), PI Keener conducted a survey targeting just IMs (n = 14) using some of the same set of questions that were previously targeted at climate scientists and resource managers. Supporting the previous year’s finding that the IM community was the crucial link to help translate downscaled projections to management, when each group of survey respondents was asked how well they understood the expertise of the other group, the IM group had the most understanding of both kinds of expertise.

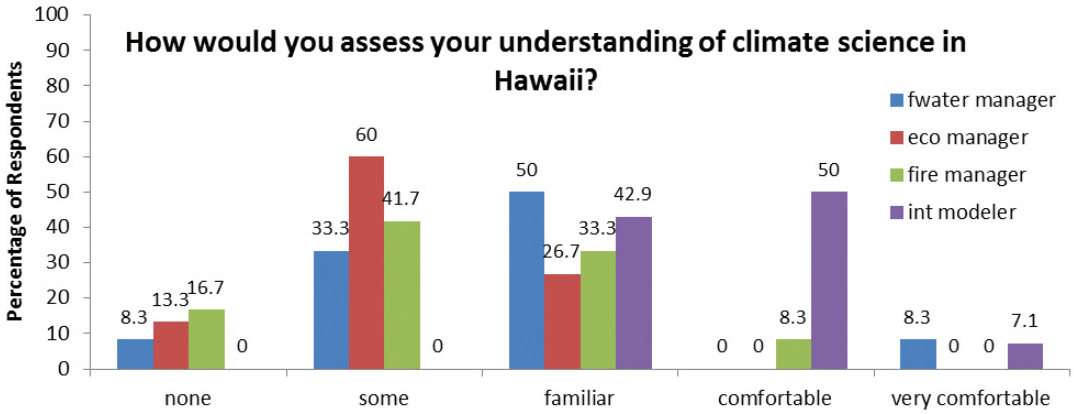

Figure 3: Of the natural resource managers surveyed in Hawaii, Freshwater Managers reported the highest level of understanding of current climate science and findings (50% were “familiar” with it, while 7.1% reported being “very comfortable”), while 100% of Intermediate Modelers reported being either familiar, comfortable, or very comfortable with it.

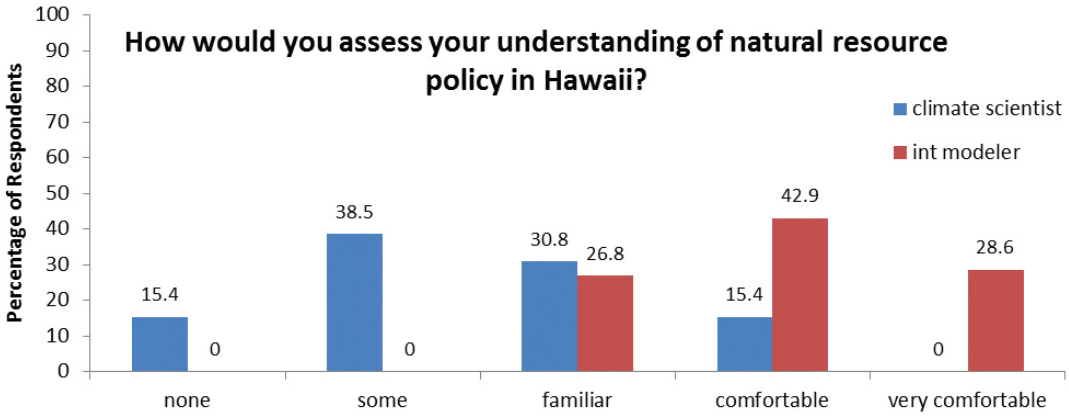

Figure 4: As research scientists, the Intermediate Modeler (IM) group reported being much more comfortable with natural resource policies and management in Hawai‘i than the Climate Scientist Group. This reinforces the finding that the IM play a crucial role in linking climate science with resource management in the state.

As an outcome of the second workshop, IMs and climate modelers decided that non-expert "climate narratives" explaining projections for each Hawaiian island would be a useful product to help ensure that IMs could accurately explain the assumptions that generated each set of downscaled projections to resource managers, and how they differ. This would allow managers to make an informed choice about how to use outputs from the different intermediate models, and would ensure consistency across IMs about communication of the projections.

Impact of Future Climate Variability on Freshwater Resources in American Sāmoa

Aly El-Kadi, Water Resources Research Center (WRRC), and University of Hawai'i Graduate Research Assistant Chris Shuler

This project, led by Pacific RISA PI El-Kadi and Graduate Research Assistant Shuler, evaluates how groundwater quality and quantity on the island of Tutuila, American Sāmoa, are influenced by climate variability and change, as well as land use decisions to address sustainable management of future water resources. In the past two years, the Pacific RISA has been able to grow both research presence and education/communication impact in American Sāmoa by; 1) collaboratively developing a climate, surface water, and groundwater monitoring network with the American Sāmoa Power Authority (ASPA); 2) modeling to quantify human impacts and partition sources of drinking water contamination in mixed-use island landscapes; 3) studying groundwater-surface water interactions throughout the island's watersheds to quantify impacts and nutrient inputs from baseflow, runoff, and submarine groundwater discharge to vulnerable coastal ecosystems; and 4) discovering the mechanisms behind surface water contamination that have necessitated the island's long-standing boil water advisory.

Researchers discovered that increased management of septic tanks and cesspools has the potential to reduce nutrient loads to groundwater. There is a strong need for special management areas on Tutuila to protect sensitive water resources. Alternative water resources are becoming even more important as the island's most productive aquifer likely does not provide sufficient filtration to produce potable water.

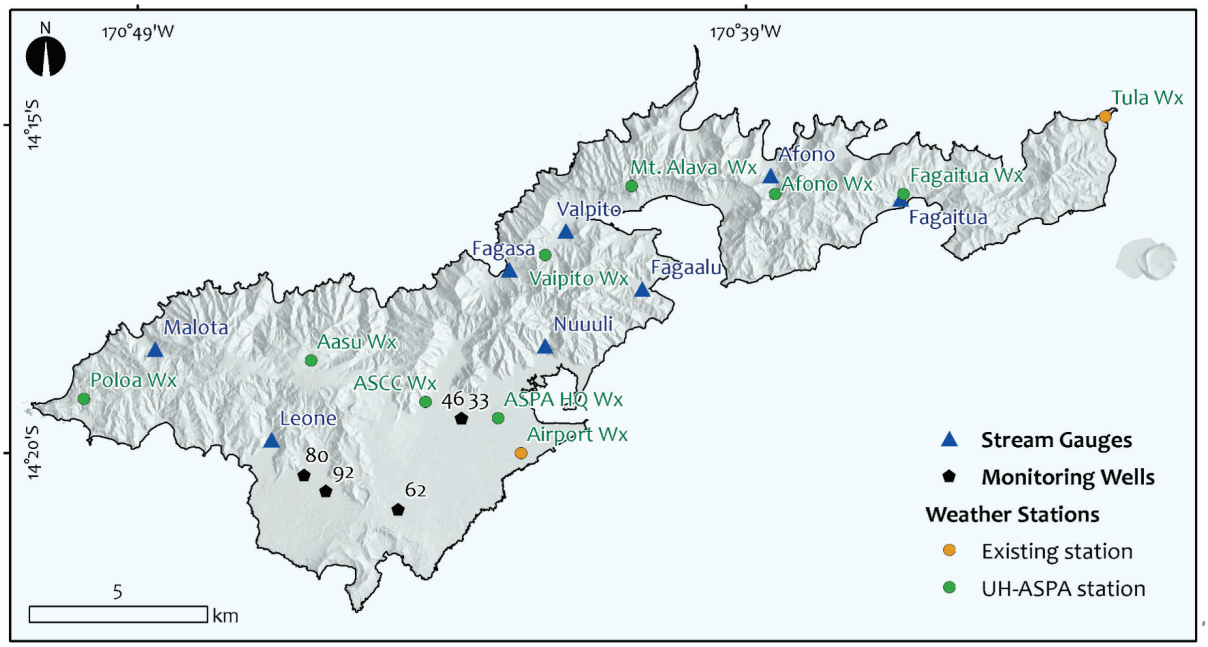

Figure 5: Locations of monitoring instruments deployed during 2014-2017 to measure climate, surface water, and groundwater data for use in numerical models and water resources management.

Image 3: Graduate student Taylor Viti assists with streamflow measurement for development of the monitoring network (Photo: Chris Shuler).

Working in collaboration with ASPA, graduate students Chris Shuler and Taylor Viti recently installed the monitoring network's first groundwater monitoring instruments designed to measure water levels and salinity in several monitoring wells in American Sāmoa. These instruments, along with weather and streamflow sensors, produce data that is being integrated into watershed and groundwater models to assess the impacts of climate change and variability on the territory's limited water resources.

Watershed Hydrological Modeling and Climate Change Impact Assessment in the He'eia and Nu'uanu Areas of O'ahu, Hawai'i

Aly El-Kadi, Water Resources Research Center, and University of Hawai'i Postdoctoral Fellow Olkeba Leta

Groundwater is the primary source of municipal water on most developed islands in the Pacific, but the reliability of water supplies on all islands will be challenged by reductions in rainfall and changes in distribution owing to climate change and continued development. Due to the high spatial rainfall gradients over short distances and lack of rainfall data for Pacific Island watersheds, this study led by Pacific RISA PI El-Kadi and Postdoctoral Fellow Leta compared and assessed the effect of rainfall data scarcity on the Soil and Water Assessment Tool (SWAT) model performance in simulating daily streamflow. Following suitability testing of the SWAT model for the Faga'alu watershed on the island of Tutuila, American Sāmoa, the groundwater coverage and amount of water that can be potentially

harvested from the He‘eia and Nu‘uanu area watersheds on O‘ahu were estimated. Both watersheds have relatively evenly distributed rainfall stations. The groundwater recharge and reservoir stored water estimated by SWAT were used as inputs for the groundwater modeling analyses. The watershed modeling process utilizes climate, hydrologic, and geospatial data.

After data analysis and quality check, the SWAT model was calibrated and validated using the daily streamflow data monitored at various stations by the US Geological Survey (USGS) Pacific Islands Water Science Center (PIWSC). The model was then used to assess the impact of climate change on water budget components and streamflows for the study areas.

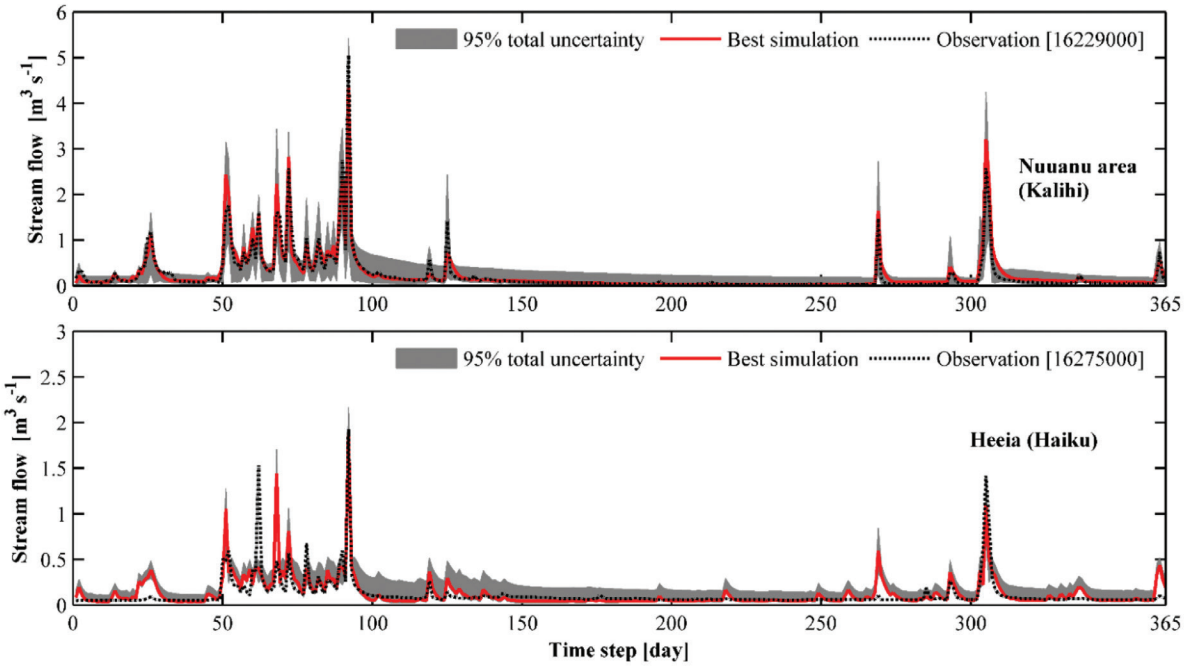

Figure 6: Observed and simulated daily streamflow with 95% prediction uncertainty Kalihi watershed (top) and **Figure 7**: He‘eia watershed (bottom).

Findings indicate that by the end of the 21st century, more frequent drought periods are expected, which negatively affect agricultural crop productivity, freshwater availability, and ecological functioning of river-riparian ecosystems. Overall, the water budget components such as surface runoff, baseflow, streamflow, evapotranspiration (ET), soil moisture, and recharge are projected to decrease by the end of 21st century. Although the temperature is projected to increase, the monthly actual ET is expected to decrease up to 8% in the future. This is most likely due to less rainfall availability, indicating that rainfall change is the main factor for the general decrease in ET as compared to temperature change. The amount of water potentially harvested by Nu‘uanu reservoir is expected to decrease by up to 36%, indicating less freshwater availability in the future with serious implications for sustainability.

Regional Pacific-Basin Migration: Climate Migration from US Affiliated Pacific Islands to Hawai‘i

Maxine Burkett, Associate Professor of Law, University of Hawai‘i at Manoa

Though much research and debate has focused on the relationship between climate and human migration, it is widely recognized that a lack of rigor and clarity characterize research on the climate/migration nexus. Climatic changes often act in concert with other socioeconomic factors to drive displacement. Moreover, factors triggering mobility are often intertwined – environmental changes can generate health problems or food insecurity, and may play an even greater role if they emerge in a community characterized by political, social, or economic tension. Numerous legal issues plague the current migration debate, including the status of migrants in transit and in host communities, domestic immigration policy, relocation assistance and resettlement rights, and ownership of natural resources.

This new initiative, led by PI Burkett, has begun to produce a comprehensive map and accompanying white paper that describes the drivers of migration, both current and forecast, as well as the stock and flow of migration over a given time period. Utilizing existing climate data and the latest down-scaled climate projections, the team will develop and apply an environmental threat index.

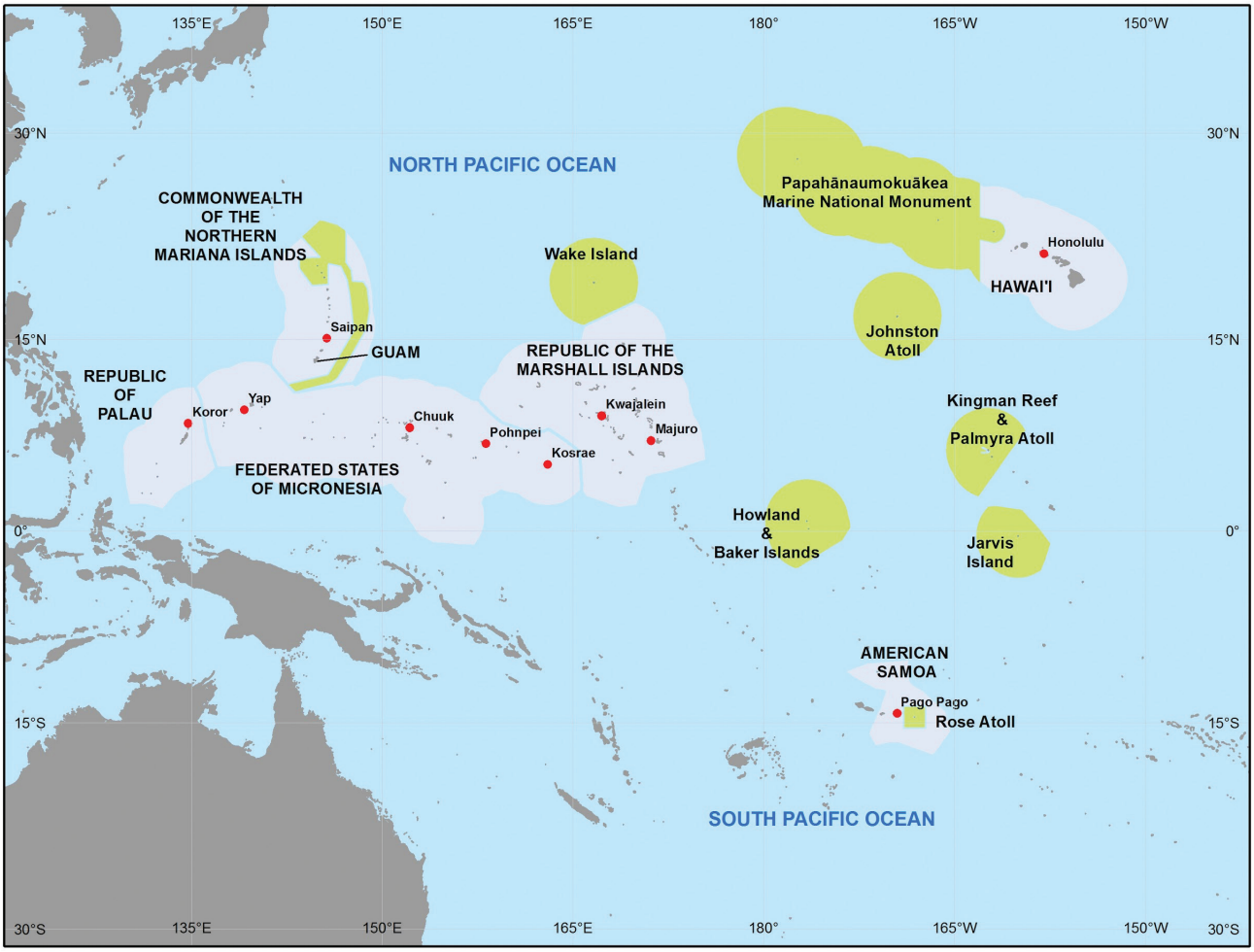

Figure 8: Map of the study area.

An in-depth study of the Republic of the Marshall Islands (RMI), examining recent migration trends, both internal to RMI and from the nation-state to Hawai‘i, Guam, and the continental US is in progress. In 2017, Postdoctoral Social Science Researcher Kees van der Gees undertook 40 days of fieldwork in the RMI, which included population center Majuro, as well as more remote Mejit and Malaelop atolls. Hawai‘i-based researcher Juno Fitzpatrick also conducted field research with Marshallese migrant communities situated locally and with relevant agencies in Hawai‘i during the summer of 2017.

Image 4: Researcher Juno Fitzpatrick surveys a Marshallese migrant in Honolulu, HI (Photo: Maxine Burkett)

In RMI, researchers confirmed that there was a high rate of out-migration, and that over 95% of respondents had migrant siblings or children. Respondents were concerned about climate change and seal level rise, but more as a future risk than as an acute and current problem. They did not perceive coastal floods and storms as frequent or severe, but drought currently poses a big problem, affecting health and agricultural productivity. Climate change and/or environmental stress is not yet considered a key driver of migration from the 3 study sites surveyed in RMI, and respondents strongly resisted the idea that their islands would become uninhabitable in the future.

In Hawai‘i, migrants from RMI considered climate change an important factor that would affect their decision to return to RMI in the future. They cited concerns about salination of agricultural lands affecting diet and health, a threat to cultural preservation, and living on atolls close to rising seas.

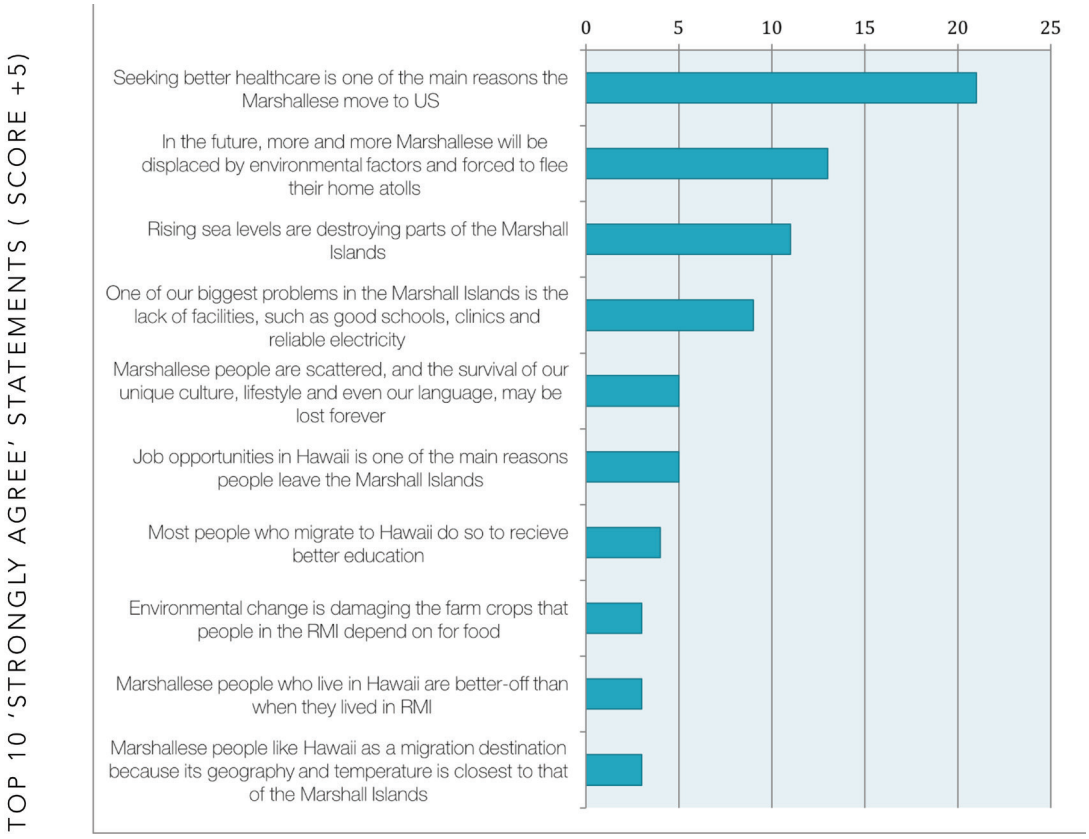

Figure 9: Top 10 “Strongly agree” statements regarding migration and climate change in the Marshall Islands.

Assessing Economic Impacts of Climate Change and Variability Planning and Adaptation

Kirsten Oleson, Department of Natural Resources and Environmental Management (NREM), University of Hawai'i, and Carlo Fezzi, Postdoctoral Research Fellow, Department of Natural Resources and Environmental Management, University of Hawai'i

Policymakers and managers need to have measures of valuation to decide between alternative adaptation options and to weigh the potential costs of inaction. This project builds on the participatory scenario process developed by the Pacific RISA to generate a set of rules concerning climate variables, management options, and policy alternatives that will be used to inform ecosystem services valuation and adaptation strategies for Maui. Led by Pacific RISA PI Kirsten Oleson and Postdoctoral Fellow Carlo Fezzi, watershed-scale modeling is being embedded in a decision support tool that quantifies, maps, and values ecosystem services from land to sea. The project, parts of which have been funded by United States Dept. of Agriculture (USDA), NOAA, and the Pacific Islands Climate Services Center (PI-CSC), leverages existing models with an aim to guide management by predicting how key ecosystem services will change under alternative management policies and climate change scenarios.
To measure the economic impact of climate change on ecosystem services, this project focuses on connecting a hydrologic and economic model of "brown water days." During brown water events, typically caused by heavy rain, people are advised to stay out of flood and coastal waters due to possible overflowing cesspools, sewer, pesticides, and pathogens. Calibration of the SWAT model for the island of Maui will help to predict future brown water events. Researchers have developed a survey to collect data from several hundred residents and tourists that use areas affected by brown water events to measure the valuation of these sites and gain insight into how current and future brown water events may affect ecosystem services and their value. The ecosystem services that are currently being captured include sediment retention, water yield, fisheries, and coastal protection. They will continue to build on this work by expanding the services captured and attaching more explicit valuations to the different adaptation options of interest under future climate scenarios on Maui.

Image 5: Brown water event (post-rain) in Maui (Photo: Bill Rathfon)

Evaluating Impacts of Climate Variability and Change on Public Health in Hawai‘i

Victoria Keener, Lead Principal Investigator and Research Fellow, and Nancy Lewis, East-West Center Adjunct Senior Fellow

As their focus for 2015-2016, the Hawai‘i Public Health Association (HPHA) chose to concentrate on exploring the potential impacts of climate change on human health in the state of Hawai‘i. Pacific RISA's Drs. Victoria Keener and Nancy Lewis were invited to sit on the Hawai‘i Climate Change and Health Working Group (HCCHWG), which was convened as a result of the Climate Change and Health Policy Action bill (HCR108, SD1) passed in May of 2015 by the Hawai‘i State Legislature. The HCCWG met 10 times during the reporting period, producing a white paper outlining research priorities and gaps on climate and health that was submitted to the Hawai‘i Department of Health (HCCHWG, 2016).

The working group recommended that a major focus for health should be on comprehensive and coordinated adaptation strategies by Hawai‘i's public health system and related services, engaging scientists/researchers, planners, and policymakers to support adaptation to changing environmental challenges and conditions. They also concluded that the Department of Health should have increased dedicated fiscal and personnel resources to lead efforts addressing the development of climate change and health public health issues, now and into the future.

Developing Future Climate Scenarios with the Honolulu Board of Water Supply

PI's Victoria Keener, Lead Principal Investigator and Research Fellow, and Laura Brewington, Program Manager and Research Fellow

The City and County of Honolulu Board of Water Supply (BWS) serves approximately one million customers on the island of O‘ahu, Hawai‘i with about 145 million gallons per day (mgd) of potable groundwater and 10 mgd of non-potable water. The municipal system supports a large urban center, but the infrastructure (including more than 2,100 miles of pipe, 212 wells and tunnels, and 171 reservoirs) is aging. Following the release of the 2012 Pacific Islands Regional Climate Assessment (PIRCA), the BWS was concerned that changing climate patterns could affect both quality and quantity of the water supply. BWS was aware of Pacific RISA's work developing future climate scenarios for the island of Maui, and wanted to pursue a similar infrastructure-centered process for O‘ahu. Even with conservation measures and repairs, freshwater demand on O‘ahu is still projected to increase by 5 to 15% by 2040, with the most increases in areas of existing high population density.

In 2015, the BWS partnered with the Pacific RISA, the University of Hawai‘i, and Brown & Caldwell consultants to assess projected climate change impacts on their infrastructure and identify vulnerabilities over the next 20 to 70 years using a scenario planning approach to consider a range of plausible future climate and socioeconomic conditions. Two all-day meetings have been held at the East-West Center with the entire project team, in September 2016 and March 2017, producing a summary of available data and an initial vulnerability assessment. The vulnerability assessment considers extreme heat, coastal erosion, wave, groundwater, storm flooding, annual and seasonal drought patterns, and changes in groundwater recharge impacts. As a project outcome in the next year, the BWS will develop a prioritized set of adaptive actions to minimize the range of climate impacts, including urgent capital improvements and updates to engineering standards.

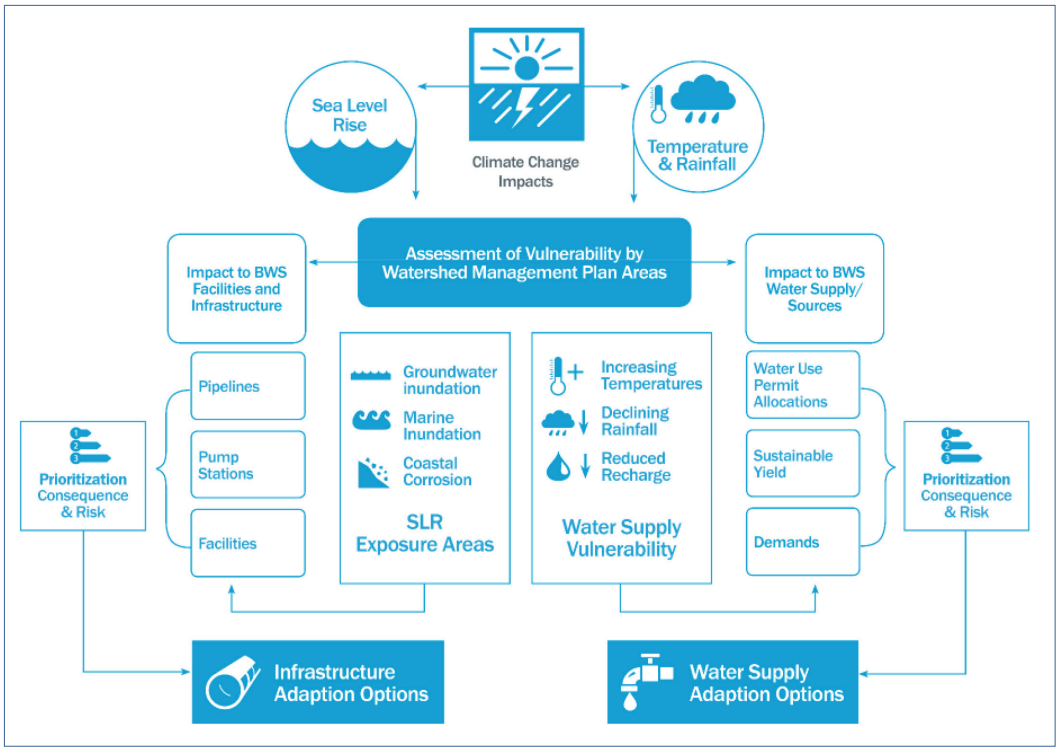

Figure 10: Brown & Caldwell overview of the Honolulu Board of Water Supply vulnerability assessment framework.

The PIRCA Sustained Assessment Process and the Fourth National Climate Assessment

Victoria Keener, Principal Investigator and Research Fellow, and Sustained Assessment Specialist (SAS) Zena Grecni

In collaboration with the PI-CSC, the NOAA Regional Climate Services Director, the East-West Center, and the Pacific Islands Climate Change Cooperative (PICCC), the Pacific RISA hired a dedicated Sustained Assessment Specialist (SAS, Grecni) to coordinate activities related to the Fourth National Climate Assessment (NCA4) and Pacific Islands Regional Climate Assessment (PIRCA). SAS Grecni also provided timely and ongoing support for the National Climate Assessment and the Development Advisory Committee.

A dedicated PIRCA website (PIRCA.org) now houses and showcases the 2012 PIRCA outputs, NCA4 resources, and upcoming PIRCA products, and serves as a valuable resource for stakeholders on the current status of regional climate and observed and anticipated trends. SAS Grecni, along with NOAA Climate Program Office staff and PIRCA partners, coordinated the development of Pacific Island narratives and case studies for the Climate Resilience Toolkit (toolkit.climate.gov), an initiative under the President's Climate Action Plan. The Pacific Islands were one of the first US regions to be featured in the Toolkit in late summer 2016. The SAS also continued to build a set of technical indicators as part of a project with the NOAA RCSD.

On May 23-25, 2016, PI Keener and SAS Grecni visited the NOAA Climate Program Office (CPO) and the US Global Change Research Program (USGCRP) in Washington, DC to present on the sustained assessment research plan, early findings, and the PIRCA website development. They found that stakeholders continue to report using the 2012 PIRCA outputs in recent presentations, political speeches, and as a reference document.

Image 6: The PIRCA website.

PI Keener and SAS Grecni coordinated the submission of a draft chapter for the Hawai‘i and the U.S. Affiliated Pacific Islands region to the Fourth US National Climate Assessment. As the non-federal Regional Chapter Lead, PI Keener, together with the diverse team of 10 regional authors, sought to maximize inclusiveness and represent the knowledge of regional stakeholders and researchers. They did this through an engagement model involving: webinars; an informal survey; six sectoral workshops (five focused on climate-related risks in each sector, and an overarching adaptation solutions workshop); town hall meetings held in Hawai‘i and Guam; and a network of more than 80 technical contributors who reviewed drafts by sector. A first draft of the National Climate Assessment regional chapter was submitted to the USGCRP in June 2017, and SAS Grecni and PI Keener continue to coordinate editing and responses to comments with the author team during the multiple review periods occurring throughout 2017 and 2018.

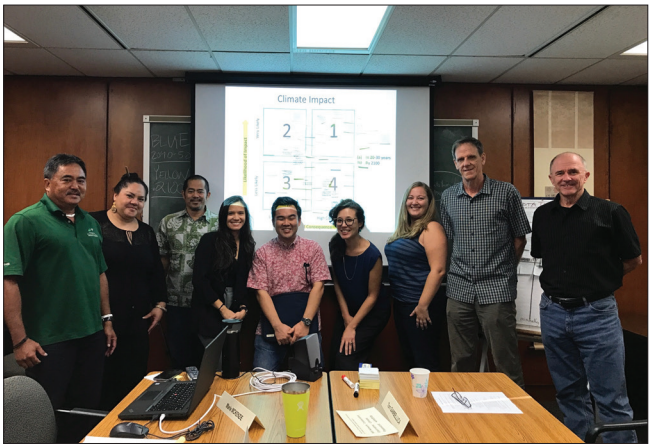

Image 7 (left) and 8 (right): Participants in the sectoral workshops for the Hawai‘i and the U.S. Affiliated Pacific Islands region chapter of the Fourth U.S. National Climate Assessment (Photos: Krista Jaspers).

Evaluation

Melissa Finucane, Senior Researcher, Victoria Keener, Principal Investigator and Research Fellow, Laura Brewington, Program Manager and Research Fellow, and Independent Evaluator Susanne Moser

Based on five years of internal tracking during Pacific RISA Phase I (2011-2015), Pacific RISA Independent Evaluator Dr. Susanne Moser synthesized her findings into a report, Supporting Hawai'i's Adaptation Efforts: The Role of the Pacific RISA (2016). This comprehensive evaluation found that research clearly dominates the Pacific RISA's work, with almost all projects involving the wide range of stakeholders they are designed to serve (Figure 12, below). This deep engagement with stakeholders has contributed to ensuring that the Pacific RISA is seen as the trusted go-to information source in the region. Despite the heavy emphasis on science, typical scientific outputs – peer-reviewed publications – are not the dominant output. Instead, products for, and encounters with, stakeholders are by far the most prominent outputs of the organization. As such, the Pacific RISA has emerged as a model transdisciplinary program.

Recent research has concerned how the Pacific RISA contributes to climate adaptation planning in Hawai'i. This work, in turn, has informed the team about how the PIRCA continues to affect the state and region. In the last two independent evaluations, Dr. Moser's research has been able to trace the Pacific RISA products to specific policy outcomes, mainly concerning the intersection of freshwater sustainability and climate change adaptation at the county and state level.

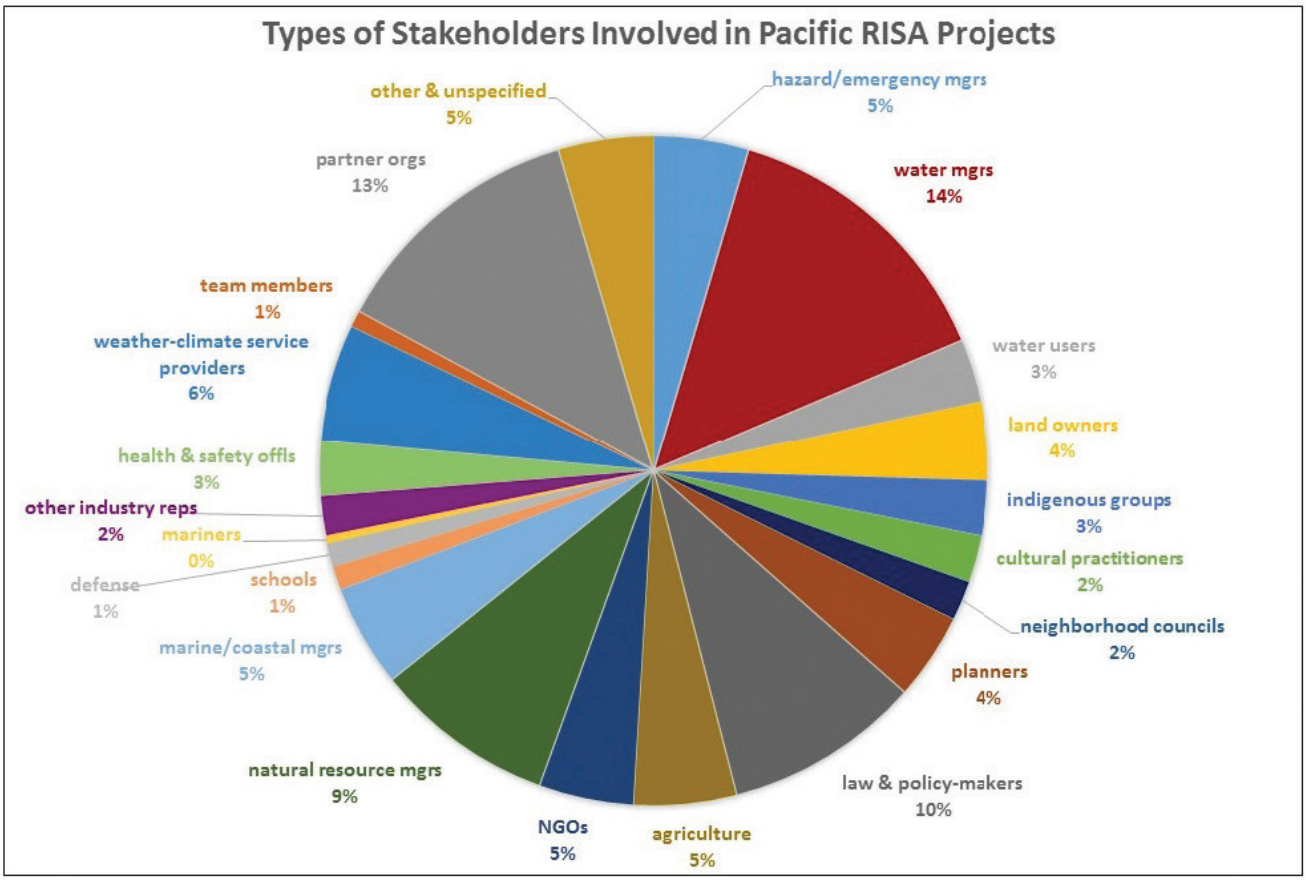

Figure 11: Types of stakeholder groups engaged in Pacific RISA projects.

An Action-Logic Model (ALM) helps to conceptualize, identify, and implement a range of evaluative metrics that can assist in defining a holistic program theory, to better achieve research goals and policy outcomes. Following the Phase I external evaluation, Pacific RISA staff modified their original ALM1 to better capture the actual work, its learning over time, and aspects previously less well captured in a revised ALM (ALM2), shown below. ALM1 may still be the best guide for the internal tracking, whereas ALM2 should inform the external evaluation, and – as a matter of foundational research – the future development of meaningful metrics of some of the longer-term impacts the RISA hopes and envisions to achieve. The emergence of ALM2 – important as it was – does and should not replace ALM1 but complement it. They offer different perspectives on the same work – an internal and an external one.

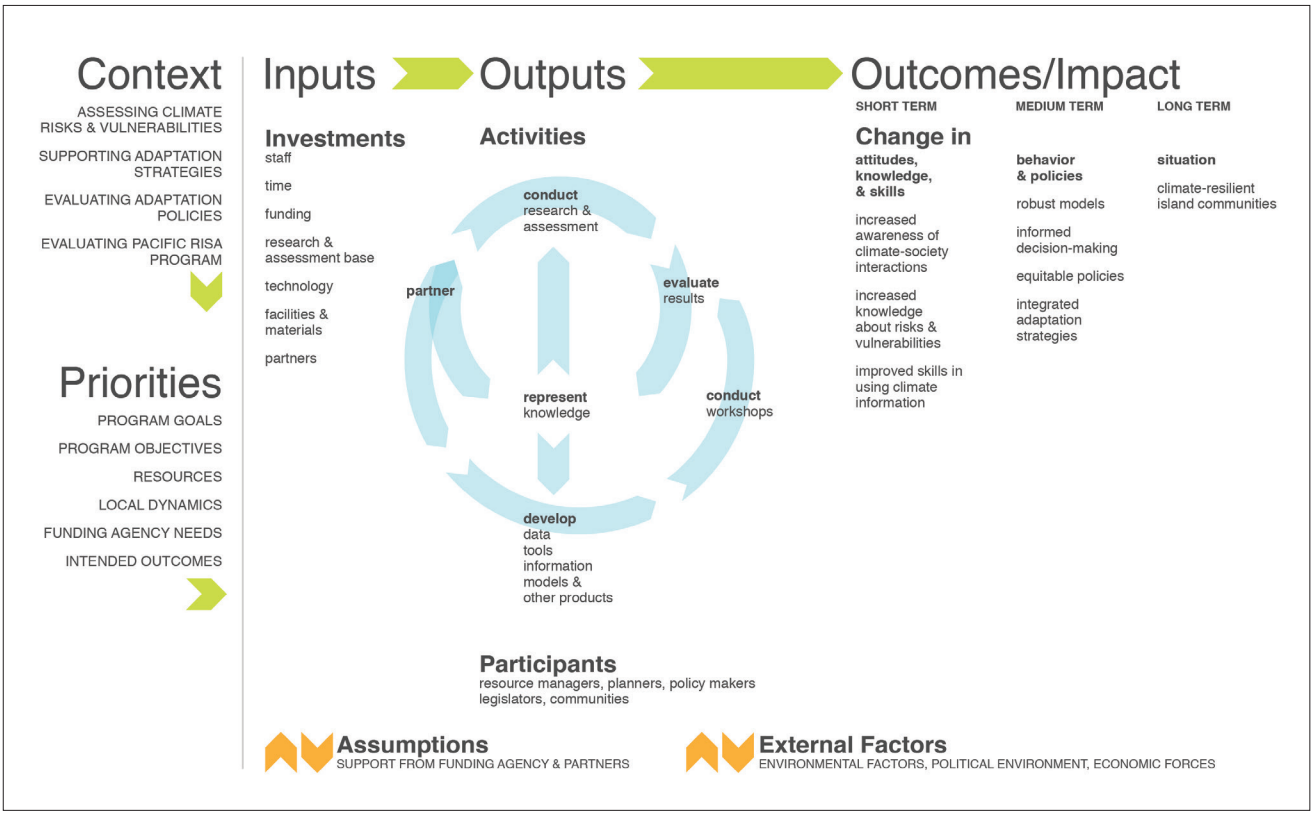

Figure 12: The current Pacific RISA Action-Logic Model.

KEY PRESENTATIONS AND MEETINGS ATTENDED/OUTREACH

Pacific RISA Advisory Committee Meeting

On April 5-6, 2016 the Pacific RISA Advisory Committee met with PIs to discuss successes and gaps in the Pacific RISA Phase II five-year award and showcase new research and plans for the Phase III award (2015-2020). About 20 participants from different sectors across the Pacific Islands region were brought together to discuss research and collaboration opportunities going forward for the RISA. Key themes that emerged included how to improve regional communication, finding new opportunities for collaboration and improving existing partnerships, identifying effective strategies for synthesizing and disseminating information, and ways of improving and leveraging existing Pacific RISA projects with regional efforts.

Image 9: The Pacific RISA Advisory Committee (Photo: East-West Center).

International Union for Conservation of Nature World Conservation Congress (IUCN WCC)

During the September 2016 IUCN World Conservation Congress, held in Honolulu, Pacific RISA hosted an open forum, “Incorporating Climate Adaptation into Agency-Level Planning in the Pacific Islands Region.”

During the session, which was open to the public, members of the Hawai‘i Interagency Climate Adaptation Committee discussed top-down and bottom-up planning strategies for adaptation to climate change in the Pacific. Speakers also examined sector-based adaptation plans in the region to identify a set of best practices for translating available climate science into realistic resource planning objectives.

Image 10: Christin Reynolds, Sustainability Measure Coordinator of Hawai’i Green Growth, addresses the audience during the ICUN WCC (Photo: Diego Noguera).

Symposium on Climate Displacement, Migration, and Relocation

With the support of the Pacific RISA, The Council on Environmental Quality, in collaboration with the Hawai‘i and Alaska Sea Grant College Programs, and the William S. Richardson School of Law, PI Burkett hosted the Symposium on Climate Displacement, Migration, and Relocation in December of 2016. The 2-day workshop brought together over 100 people from the mainland, Hawai‘i, RMI, and other Pacific Islands to discuss legal and social issues related to climate-induced migration. The workshop connected communities that are dealing with the impacts of climate change and planning for a climate change future. The workshop facilitated a lot of collaboration amongst diverse communities that have experienced the impacts of climate migration and relocation. As a result of the workshop, 7 authors contributed to a special issue of Climate Law outlining legal and policy questions about United States internal and cross-border migration, and from Pacific Islands to the United States.

PUBLICATION HIGHLIGHTS

“Climate Matters for Ridge to Reef Ecosystems” Documoment

The new seven-minute video, titled “Climate Matters for Ridge to Reef Ecosystems,” focuses on climate change impacts in West Maui forest watersheds and reef ecosystems. The video features interviews with two Pacific RISA stakeholders from the Maui Future Climate Scenarios project, each representing part of the ridge-to-reef climate and ecosystem connection. The “Climate Matters for Ridge to Reef Ecosystems” documoment can be viewed online at https://vimeo.com/214577783.

Image 11: Pacific RISA’s newest documoment “Climate Matters for Ridge to Reef Ecosystems.”
Past Pacific RISA documoments can be accessed on the Pacific RISA website at http://www.pacificrisa.org/education-outreach/documoments/.

PUBLICATIONS

El Niño and Pacific Island Fact Sheets https://www.pacificrisa.org/2015/11/12/pacific-island-fact-sheets-released-on-el-nino-and-sectoral-impacts/

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