Discussion Session Notes
Climate Change Impacts on Freshwater Resources in Hawaii

7-15-2011 Workshop

1. **Discussion Session #1: What impacts will climate change have on fresh water resources in Hawai'i, especially the Central Oahu Watershed, in the next 10-50 years?**

   - Less water availability, greater risk of lower quality water.
   - Reduced agricultural productivity due to reduced water.
   - Greater pressure to reuse and reclaim water (i.e. surface water runoff) as substitute for less rainwater.
   - Likely decreased health of forests, decreased capacity for recharge. Need to increase focus on watershed partnerships, mauka forests.
   - Greater risk of salt intrusion.
   - Pollution of aquifer from saltwater intrusion into saltwater lens.
   - Standard premise has been that severe storms will increase- greater land-based sources of sediment and runoff.
   - Hawaii may be less desirable as tourist destination and living place for residents, may decrease economy.
   - Decreased fog interception, change forest composition. How will the orographic cloud change and how will that impact forest composition and fog drip?
   - Increase in exotic species, decline in native species. Movement of native species mauka.
   - Less volume of freshwater in coastal ecosystems such as tributaries, springflows. Less freshwater entering the ocean will affect marine coastal ecosystems.
   - Infrastructure impact: underutilized infrastructure, need to upgrade methods of construction to maximize water catchment, optimize/redistribution of well pumping.
   - Public health- change population dynamics of mosquitoes/vectors, spread of disease (dengue in Pearl City and Kona).

- Selection of crops that are grown because of changing weather patterns.
- Wastewater treatment facilities affected through overall change in water volume.
- Policy impacts (discuss later).
- Changes in consumption patterns associated with changes in tourism.

2. **Discussion Session #2: What do we need to know to effectively prepare for and address these impacts? Who is collecting needed information now? What additional information/analysis is needed?**

- What is the relationship between volume of rainfall, temperature, recharge, etc.
- Whether extreme rain events will decrease or increase in number and intensity.
- How different plants will be affected by or adapt to changes in rainfall and evapotranspiration (native and non-native).
    - Also impacts on invasive species who prey on plants.
    - Possible increase in invasive pests.
    - What plants are best vectors to capture rainfall and increase recharge? Both native and invasive.
- Vector response to changing climate- very local responses, impacts on specific populations of specific species.
    - Need vertical or ahupuaa-based analysis, not just horizontal studies.
- Dense network of rain gages and weather stations.
    - Number of rain gages is decreasing, were maintained by plantations, etc.
    - Long-term baseline gages are steadily decreasing, also for streamflow monitoring.
- Streamflow patterns in Hawaii are different from mainland patterns- high-flow events very important for flushing out exotics.
    - Impacts in variability in streamflow and high-flow events on flora and fauna.
- Impacts of all of these changes including SLR on coasts, estuaries, beaches.
- Construction projects/development required to maintain open land for recharge.
    - Utilize water/climate info in development projects.

- Translate science and technical analysis into action-oriented recommendations. Simple overview information for scenario planning.

- What is the understanding of climate change impacts on fresh water at policy level (i.e. sources of funding). Do they believe climate change is an issue?

- Lack of collaboration between data collectors and people developing studies. How do we make data useful and shared across management agencies, and reduce duplication of efforts.

<u>Key thresholds/metrics used to make decisions?</u>

- Recharge- 10% decrease in precip = 10% decrease in recharge?

- What is relationship between rainfall and recharge?

- Standard metrics-24 hour storm, 10 year frequency etc. How is this changing due to climate change? New metrics for measuring storm events and types of events.

- Are there some measurements we're using now that are no longer relevant? i.e. is a 180-day moving average on well head too broad to capture seasonal issues, if there's seasonal change due to CC?

    - Pumping effects? Well head metric dependent on pumping rather than recharge?

- Most persuasive info for policy makers:

    - Money. How do technical impacts influence income/economy?

    - How will user needs be impacted? Demand-side issues re. water needs.

    - How demand for water will change for different users?

    - Translate science into really simple conclusions. Concrete numbers and real-world scenarios. Policymakers can then set goal for i.e. water reduction by specific year and percentage.

- How certain does science need to be?

    - Doesn't matter because no one's going to trust it anyway. People always want to wait for the definitive study because of the preponderance of evidence.

    - A simple policy directive that translates the preponderance of evidence is most important.

- Building a model that uses integrated platforms: climate, water, infrastructure. Doesn't necessarily require a solid number, but shows relationships in the changes of interactions between platforms and how those changes impact policy recommendations.

- State politics driven by voter concerns- if voting population supports an issue, the politicians will respond. Need to increase public understanding and popular support.

3. **Discussion Session #3: What organizational, capacity, political, and other challenges do we face when gathering and using information to address climate change impacts on fresh water resources?**

- Situations often stifled by the vocal minority, i.e. climate change deniers.
- Distrust of information.
- Distrust of public institutions and info they disseminate.
- Information may not be in the correct form for use by multiple agencies.
    - Data aren't standardized.
    - People don't want to share their data with others- limited access.
    - One solution- develop portal site to store date that can be publicly accessed by scientists and communities to address local-level issues.
        - May require capacity building for non-experts. I.e. citizen science program.
- Lack of funding, i.e. for monitoring.
- "Turf issues": foundations tend to pick certain issues and focus only on them, while water and climate change are broad cross-cutting issues that are more difficult to addresses, and are not used to "brand yourself".
- Science: difficult to get major federal agencies to fund long-term monitoring.
- What indicators are popular for monitoring changes over time.
- Infrastructural lock-in: people are set on what they study/focus on, no room for change over time. Huge issue for institutional development.
    - i.e. converting potable irrigation to recycled water.
    - Need small visible successes to remove reluctance to change.
- Reduce and conserve- preserve water already present in the ground. Doesn't require funding, saves money, requires no infrastructure investment.
    - Are public conservation efforts effective? Water conservation efforts have been, through both technological advances (low-flow toilets) and change in mindset across generations.

  - Increase in rates encourage public conservation.
  - Cheaper to fix leaks than to let them run and waste water.

- Capacity issues- are people able to make use of data if it's available?
- More data that can indicate larger trends are effective in showing reduced uncertainty.
- Scientists and technicians can be very influential without legislative support, i.e. artificial rate hikes to decrease consumption.
- We don't need legal/regulatory changes or external/federal funding, we need leadership to accomplish change.
  - Need to get out of mindset that we need mainland help to run the state.
  - Start conditioning current land use projects on existence (or non-existence) of future water resources- change mind-set to long-term planning.
  - Need group of people to support change and provide leadership.
  - Mid-career people have most trouble accepting change.
- Kona is an area with increasing development pressure, and unique water resource challenges.
- Increase timeframes in public understanding, move away from political timescale.
- Policy tool that successfully ties water use to development would be hugely important.
- Current disconnect between development planners and water managers.
- Limitation on development because of water supply availability.
- Every government agency is in their own silo and has their own goals, no inter-agency collaboration. Need both a collaboration plan AND the leadership to implement it.

- All agencies are limited, be it financially, technically, in capacity, etc. Need for a mechanism through which to interact and leverage agency's skills with that they lack.

4. **Discussion Session #4: How can we most effectively confront organizational, capacity, political, and other challenges to effective information gathering and usage?**

- Taskforces focused on specific issues.
- Cross-agency communication.
- ORMP example: multi-level, multi-disciplinary
- Data issues: people want a centralized website to store data, but lack of capacity to create that resource. Not enough staff to collect info, no capacity to store it, not enough experts to analyze it, etc.
- Larger group is good for collaboration but can be harder to manage.
- Forum where people can collectively decide what the issues are.
- All 4 counties represented.
- Can regulations be changed to accommodate island-specific needs? Yes there is a legal mechanism through which the general public can to initiate rule changes.
- Federally-mandated Hawaii agencies are different, can have less flexibility.
- Hawaii legal framework different from most mainland systems, sometimes more strict.
- How do we educate decision-makers in other agencies, private sector?
- Precipitation trends, freshwater supply, cost- 3 most crucial things to show people.
- Must be unified scientific consensus, otherwise decision makers will not accept the science.
- Regional climate assessment process- long-term effort. Short-term idea is to coordinate with scientists throughout the region to determine the state of the climate right now. Longer-term idea is to create a consensus forum/dialogue to bring together decision-makers, scientists, stakeholders and produce single technical report that synthesizes all available info.

- Scenario development- qualitative process to zoom in on possible futures and their consequences. Successful in rallying people to where the gaps are and what the key ideas are.

- See May 2011 DOI/EPA/CEQ Report Climate Action Plan, addresses all these questions (Derek Chow). [Draft National Action Plan: Priorities For Managing Freshwater Resources in a Changing Climate. (National Climate Change Task Force, 2011)]

- Water-focused briefing sheet (similar to ICAP's new Hawaii Climate brief). Inspires legislature to gather more info.

- Provide incentives or disincentives: either pay people to do something, or require people who aren't willing to do something to pay.

- Funding barrier: need dedicated source of funds.

- Appropriations, grants, watershed planning grants are good but not sustainable.

- Need to establish fees or some other dedicated source of funds that is sustainable and long-term, fair and equitable across all users.

- Mainstreaming climate adaptation so it's not external to everyday processes- creative reorganization to add climate lens to current processes (assuming stability of funding and monitoring).

- Fully agreed-upon climate science is not required to make on the ground adaptative decisions, i.e. Chip Fletcher's SLR adaptation efforts

5. Discussion Session #5: Next Steps

Pacific RISA will do:

- Email out workshop notes in next week or so, please review and provide feedback if you have any.
- Online survey to complete 3-part project will be completed in next month or so. Final report will incorporate all findings from project and inform NCA process, will be provided to you for your feedback.
- NCA process: technical reports, briefing sheets at various levels of technicality
- Regional climate assessment process- long-term effort.
- Short-term idea is to coordinate with scientists throughout the region to determine the state of the climate right now.
- Longer-term idea is to create a consensus forum/dialogue to bring together decision-makers, scientists, stakeholders and produce single technical report that synthesizes all available info.

Other suggestions:

- Fastest way to get technical info into use is to be an expert witness in a contested case.
- Create piece of legislation with a specific recommendation based on practice/legislation that has worked somewhere else.
- Legislators will pay attention to any issue that they actually have to vote on.
- Need more collaboration between scientists/academics and non-profits/on the ground workers to incorporate different types of knowledge. Don't need funding for this kind of work.