LESSONS LEARNED FROM THE COMMUNITY WATERSHED SNAPSHOT PROJECT

HAWAI'I CONSERVATION ALLIANCE
A Partnership Dedicated to Environmental Stewardship, Community Engagement, and Conservation Capacity
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The Community Watershed Snapshot

Individuals representing Papahānaumokuākea Marine National Monument and University of Hawai'i-Hilo, Kū'ula (an integrated marine science course) conduct an opening inspired by Kanaloa, Hawaiian god of sea and the Kumulipo for the 2016 IUCN World Conservation Congress Ocean Pavilion Event featuring the UNESCO World Heritage Launch for World Heritage in the High Seas, September 2016.

"AS HAWAIIANS, WE RELATE TO THE LAND AS OUR ELDER SIBLING. THE LAND TAKES CARE OF US, AND WE TAKE CARE OF THE LAND. FROM THE AIR WE BREATHE, TO THE WATER WE DRINK, TO THE FOOD WE EAT, EVERYTHING COMES BACK TO THE RELATIONSHIP THAT WE MĀLAMA SOMETHING."

– NOELANI YAMASHITA, KA HONUA MOMONA
DESIGN WORKSHOP WAIMEA, HAWAI'I ISLAND SEPTEMBER 2014

Front cover, top left: **Site Planning Meeting with community representatives from Maunalua, Hā'ena and Hau'ula, O'ahu, September 2015**
Middle right: **Lessons Learned Workshop O'ahu, July 2016**

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Hau'ula Focus group, Site Planning Meeting, O'ahu, September 2015

PROJECT HISTORY

<< Honolua to Napili, Maui

2013

- 8 Community Consultations Statewide
- Watershed Boundary Maps, Scope of Communication Tools and Metrics Confirmed

<< Waimea, Hawai'i Island

2014

- Convening of Communities Statewide to Solicit Interest in Snapshot Participation
- Intellectual Property, Data Sharing Agreement, HCA ARC GIS Tool Demo Data Discussion, Communications 101

<< Hā'ena, Kaua'i

2015

- Site Planning Meeting on O'ahu and Moloka'i for 6 Volunteer Communities
- Maps with Available Data, Metrics Checklist, Site Plan Development, Additional 2-3 Metric Selection, Project Timeline, Metric Data Compilation

<< Maunalua Bay, O'ahu

2016

- 3 Community Engagements
- Watershed Health Web Map and Snapshot Web Maps for each of the 3 sites
- Water Quality: Training, Consult, Collection, Supply Kits and Monitoring Plans
- Community Data Gathering: Community Involvement in Resource Management, Place Names, Local Knowledge
- Lessons Learned Workshop
- IUCN WCC Pavilion Event

OVERVIEW

Between 2013 and 2016, the Hawai'i Conservation Alliance (HCA) carried out the "Community Watershed Snapshot" (CWS) project. The purpose of the CWS project was to create a community-led process for periodically measuring the status and health (a "snapshot") of local watersheds through time, so as to inform local community discussions and support local watershed management decision-making by community leaders and State and County officials. A summary of the key achievements made throughout the process of implementing HCA's CWS project from 2013 through 2016 is presented in the timeline above and in more detail below.

2013: COMMUNITY-LED DESIGN OF THE WATERSHED SNAPSHOT METRICS

The HCA CWS project commenced in 2013. Over the period of several months, HCA visited and consulted with community leaders and local stakeholders from eight ahupua'a across the main Hawaiian Islands, inviting their feedback and suggestions on how best to measure the health of their local watersheds. The eight ahupua'a were selected by HCA members, based on several criteria including the importance of the watershed for native biodiversity, the presence of an active and informed group of local stakeholders focused on watershed stewardship, and cultural and geographic diversity across the main Hawaiian Islands.

> ***"There is a sense of hope attributed to days of effort that are donated to outsiders and researchers that will one day return to the community as a collective story or information that is relevant at the site level. Accountable researchers who are humbled by the opportunity (e.g., Hā'ena) to conduct research are able to give back to the community by contributing to a collective library."***
>
> - KAWIKA WINTER, PHD, NATIONAL TROPICAL BOTANICAL GARDEN, DIRECTOR LIMAHULI GARDEN AND NATURE PRESERVE

top left: **Hā'ena Community Consultation, Kaua'i September 2013**
top right: **Community Watershed Snapshot Design Planning Workshop with all 8 communities, Waimea, Hawai'i Island September 2014**

Prior to each consultation, a watershed map with the relevant ahupua'a boundaries were developed by HCA for each of the eight communities consulted. The maps were developed based off of HCA's ArcGIS database and online webmap portal. These ahupua'a maps were reviewed, discussed, and in some cases adjusted/corrected by community participants as part of the HCA consultation process.

The nearly 80 local representatives who attended and participated in HCA's community consultations collectively identified a shared set of mauka (terrestrial), makai/wai (ocean/fresh water), and na'ike (socioeconomic and cultural) indicators that they believe are important for understanding the status and health of their ahupua'a (i.e., to complete a "snapshot").

2014: VOLUNTEER COMMUNITIES STEP FORWARD TO CONDUCT A SNAPSHOT

Following formal review and consideration of these three sets of watershed health indicators by HCA's members during late 2013 and early 2014, a set of ten biophysical and four socio-cultural metrics of watershed health were confirmed and endorsed by HCA during 2014. This was followed by a CWS design workshop that was held in Waimea, Hawai'i with the eight communities consulted by HCA the year prior. During this design workshop, six of the eight attending communities volunteered to become the first sites to attempt conducting a watershed snapshot.

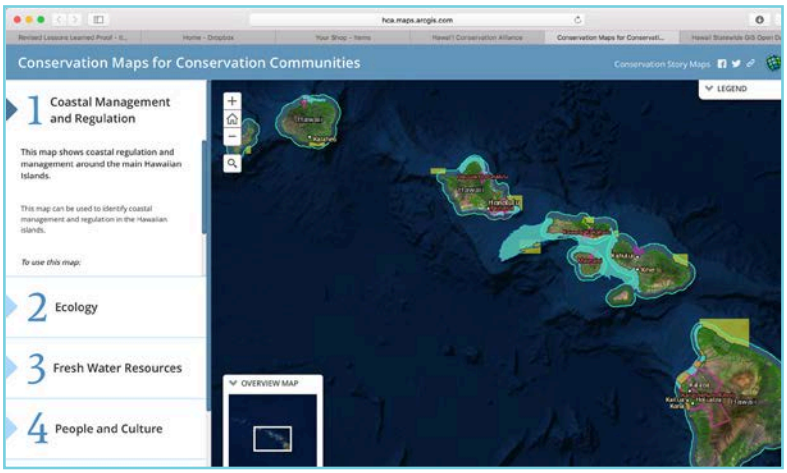
As part of this process, an intellectual property and data sharing agreement was developed between the volunteer communities and HCA. The six volunteer communities also began discussing the communications product format that their snapshot results would take, once the selected watershed health indicators had been measured.

2015: SNAPSHOT PLANNING AND DATA COLLECTION COMMENCES

During 2015, workshops were held by HCA with the six volunteer communities to complete site planning for measuring two to three CWS metrics that were selected by each volunteer site. Out of this site planning process, three volunteer communities identified themselves as willing to conduct a snapshot immediately (i.e., during 2015-2016): Hāena, Hau'ula/Punalu'u, and Maunalua ahupua'a (from Kaua'i and O'ahu islands). The three remaining communities (from the Maui Nui island group and Hawai'i Island) deciding they would conduct a snapshot later (during 2017), off of the completion of the first three sites snapshot completion.

Following the site planning workshops, available data relating to the selected metrics were identified, collated, and entered into HCA's GIS database for site use. Where data did not exist for selected metrics (including most of the socio-cultural and several of the biophysical metrics), HCA worked with each volunteer site to develop a plan for data collection on-site, with technical support from HCA members and the provision of data collection equipment (e.g., water quality testing equipment). Data were collected at a site level and submitted to HCA for collation and georeferencing throughout the second half of 2015 into the first half 2016.

Volunteer sites also identified and designed target communications products through which to share the results of their watershed snapshot results, resulting in site-based communications plans that were supported by HCA.



above: **Community Watershed Snapshot Lessons Learned Pavillon Presentation, IUCN 2016 World Conservation Congress, Honolulu, Oʻahu, September 2016**
top right: **Watershed Health Web Map, one of the Arc GIS Online Tool products developed for communities. Visit hca.maps.arcgis.com**
opposite page, from top to bottom: **Mauanalua Community Consultation, Oʻahu, September 2013, Hāʻena Focus group, Site Planning Meeting, Oʻahu, September 2015, Site Planning**

2016: FIRST THREE WATERSHED SNAPSHOTS COMPLETED

During the first half of 2016 the volunteer sites finished up data collection for their selected metrics of watershed health. At the request of volunteer sites, this included HCA conducting a water quality monitoring training workshop, followed by providing equipment and on-site technical support for water quality data collection. Data collection on-site by volunteers included identifying and documenting traditional Native Hawaiian watershed feature place names, quantification of local participation in natural resource management activities within the watershed, and measurement of local awareness and traditional knowledge with elders and other community stakeholders.

Also during 2016, volunteer sites worked closely with HCA on the design and production of their selected snapshot results communications tools; for example: ahupuaʻa maps, infographics, and fact sheets. Webmaps of watershed health and snapshot metrics were also generated by HCA using its ArcGIS online webmap.

Finally, volunteer sites participated in a workshop during mid-2016 to share and document lessons learned out of the CWS process. This includes both site-specific and shared lessons learned, as well as key findings and advice to be shared with outside communities interested in conducting a watershed snapshot of their own.

2017 AND BEYOND: HCA'S FUTURE COMMUNITY ENGAGEMENT

During 2016, HCA members conducted an internal survey and held several group discussions regarding the future of HCA's engagement with communities at the site level. As a consequence of this internal review and discussion, HCA has re-confirmed its interest and intention to continue engaging and supporting communities across the main Hawaiian Islands on their site-based conservation efforts. The specifics of this future community engagement by HCA will be defined during late 2016 and early 2017 as part of a broader HCA strategic evaluation and planning process, and may include future support in terms of conducting watershed snapshots.

The lessons learned and key findings documented in this report are presented with the intention of potentially being useful in helping to guide the future application and use of the watershed snapshot process. The development of a watershed snapshot guidebook has been proposed by HCA, and would further support this report in future efforts to conduct watershed snapshots throughout Hawaiʻi, and beyond.

SHARED LESSONS LEARNED

The following section presents the common, or 'shared' lessons learned by individuals of the community sites of Hā'ena, Hau'ula/Punalu'u, and Maunalua in terms of both the utility and process involved in the completion of their site-based watershed snapshots. Site-specific lessons learned can be found in Appendices I on page 13.

THE REPORTED COSTS AND BENEFITS OF CONDUCTING A WATERSHED SNAPSHOT

The three volunteer communities have identified several sets of costs and benefits in conducting site-based watershed snapshots.

COSTS	BENEFITS
TIME • Expect up to several months to a year of effort to complete a first, full snapshot. • Can be challenging to find adequate time for community representatives to engage in the snapshot process meaningfully, in part due in part to employment (day jobs).	**TIME** • Opportunity for participating sites to take snapshots of selected metrics over multiple years, allowing comparison through time. • A snapshot can be completed every 2-3 years, over a period of a few to several months.
AREA/SIZE • Conducting a snapshot can be difficult for sites with larger watershed areas, due to the logistics required to measure metrics across a large area; is logistically easier for smaller-sized watersheds. • A statewide snapshot effort requires long-distance communications between multiple participating sites across the main islands.	**AREA/SIZE** • No community is too big or too small to participate in the snapshot process; it is scalable to any size watershed (or multiple). • Watershed-sized focus is done at a large enough area to encourage sharing with the wider public (whole community); can help to raise broad community awareness of issues facing the larger watershed. • Traditional place names within (and across multiple) ahupua'a are emphasized through the snapshot process.
FUNDING • The watershed snapshot process requires funding, particularly for data collection and production of communications products. • Financial support to community-based watershed management efforts is typically limited or not available. • Funding may be needed for monitoring equipment and training on measuring metrics. • Cross-site workshops to share lessons learned will be limited due to the costs of bringing everyone together.	**FUNDING** • The watershed snapshot process can bring multiple local organizations and community groups together around a specific metric of shared interest; for example, water quality. This provides opportunities to cost-share among multiple groups/sources of funding. • Collaborative funding of a watershed snapshot can help multiple groups unify around a new, commonly held objective or campaign. This can in turn support a wider fundraising campaign to benefit multiple groups and local organizations.

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COSTS	BENEFITS
COORDINATION · Where there are multiple, different groups or organizations working on natural resource management within a single watershed, coordinating among these different interests and groups to conduct a snapshot can be challenging. · Clear and consistent communication among all people and groups involved throughout the snapshot process takes time and effort to do well. Where communications are unclear or ineffective, this can slow or limit coordination during data collection.	**COORDINATION** · The watershed snapshot helps to bring different community groups and local interests together in a non-threatening, non-competitive way; from the upland/mountainside habitat down through the coastal waters. · The process requires everyone to coordinate on data collection and communication. This can be useful in that it increases communications between groups, strengthens personal relationships, and improves coordination on other (non-snapshot related) activities. · The coordination process can broaden the contacts and networks of groups involved. · Collaborative work can help the community prioritize the key issues (as identified by selected metrics) to take action on together.
EFFORT · Inconsistent participation by individuals or local groups through time can lead to reduced interest and awareness of the snapshot and why it is important. · Process requires designated individuals within each participating group to consistently communicate about the snapshot process so that continuity of engagement and awareness is maintained through time. This equates to additional time and effort required. · Technical assistance may be required to both initially conduct (including training) and carry on (through time) certain snapshot metrics.	**EFFORT** · Snapshot results can raise the awareness of local residents and provide new opportunities to create important, data-driven messages based off of metrics measured. This can lead to mobilizing public support for change with support from local decision makers. · Technical metrics can necessitate assistance from outside experts, thereby recruiting them in to support local initiatives, building local capacity, and increase community resilience. · Snapshot process supports and strengthens community-based, grassroots-driven conservation efforts.
VISION · Historically, measurement of metrics and related research has not been tied to the local community's interests or vision for its future. · Data collected on metrics in the past have not always been shared locally with communities or local leaders and elected officials. This has made it hard for results of measures/metrics to inform and guide local action.	**VISION** · Snapshot metrics can be used to invite your community to work together around a commonly shared vision to address key issues and take positive action, as informed through the results of metrics measured. · The community-focused watershed snapshot process represents hope for the future and a shift toward collaborative management efforts that consider and include local priorities.

THE REPORTED UTILITY OF SNAPSHOT RESULTS

Building off of the reported costs and benefits of conducting a watershed snapshot, the three volunteer communities reported that the process of conducting their site-based watershed snapshots was useful to them in a few ways that otherwise would not have been possible locally.

Most importantly, the snapshot process raises local awareness around important watershed issues and creates opportunities to generate new interest to take action.

Next, the snapshot encourages comparison of metric results between sites and watersheds, across a wider geography than normally is considered locally; for example, across an island chain. This comparison between sites and across watersheds was found to be useful in that it can allow certain sites with lower 'scores' on specific metrics of watershed health in comparison to other snapshot sites to reach out and talk about why their results are lower than at other sites. This can highlight the consequences of decisions and mistakes made in the past that have contributed to these lower scores, encouraging other sites to not repeat such mistakes.

Also, the snapshot process identifies useful information that is being gathered by outsiders (non-local groups) and can be shared locally; for example, research being conducted by University students or State and Federal government scientists. The snapshot creates an opportunity for those involved to formally request that all relevant research and information being collected in the watershed be made available locally, including to local schools and community groups. Making such data available locally may lead to improved local understanding more informed decision-making.

Finally, the snapshot process raised public awareness around cultural and historic information that may not consistently be considered today. For example, the snapshot process identified, documented, and has led to the increased

above: **Community Watershed Snapshot Design Planning Workshop with all 8 communities, Waimea, Hawai'i Island September 2014**
top right: **Community Watershed Snapshot Lessons Learned Pavillon Presentation, IUCN 2016 World Conservation Congress, Honolulu, O'ahu September 2016**

awareness and use of traditional Native Hawaiian place names at the volunteer sites.

LESSONS LEARNED ABOUT SPECIFIC SNAPSHOT METRICS

Relating to the "Water Quality" Metric:

• Water quality specialists/professionals may be needed regularly for technical assistance on-site.

• It is critical to have equipment and supplies for water quality testing. Such equipment needs carefully stored and readily accessible by a designated, responsible partner/individual.

• Clarity is needed on where (specific geo-location) water quality data collection sites are located, and why (rationale) they were chosen at each location.

• Lawsuits may constrain or restrict how and if data collected can be shared.

Relating to the Socio-Cultural Metrics:

• Begin with old/traditional boundaries for *ahupua'a* (e.g., fishpond locations, Kingdom maps), instead of current government maps, as current maps and GIS data layers may be inaccurate/incorrect (including boundaries and place names).

• Some cultural and place name data may be highly sensitive, and not easily accessible from elders. Also, some traditional boundaries on historic/Kingdom maps may directly challenge current landowners in terms of property lines.

• It is important to secure free, prior, and informed consent with all elders interviewed. Full digital video or audio recordings of elder interviews and oral histories are preferable over written summaries alone. Also, explicit permission in writing should be documented prior to use of any kupuna quotes for sharing with any outside audiences or communications products.

• Collection of cultural metrics can be holistically focused within a 'biocultural' context, highlighting the linkage between biological and cultural factors.

Metrics that may be more difficult to comprehend and/or communicate with layperson audiences locally include:

• Benthic Habitat Quality
• Native Vegetation Cover
• Key Bird Species
• Marine Invertebrates and Algae

Metrics that are closely associated with people's personal connection to their watershed, including through diet, health, and recreation, include:

• Availability of Freshwater
• Water Quality
• Target Food Fish
• Population Size and Growth
• Health/Diet

Metrics that are useful for cross-site watershed comparisons include:

• Water Quality
• Land Use Patterns
• (Current extent of remaining) Native Vegetation Cover
• Target Food Fish (and relative abundance of other keystone reef fish species).

Site Planning Meeting with community representatives from Maunalua, Hāʻena and Hauʻula, Oʻahu, September 2015

OBSERVATIONS BY OUTSIDERS

During the snapshot process, several 'outside' HCA members and partners supported the three volunteer sites locally with conducting their snapshots. As 'outside' partners in support of the local snapshot efforts, the following observations were raised regarding the snapshot process conducted:

- A significant amount of effort and learning was completed across all three volunteer sites, and they are to be commended for this.
- Each community has a different level of existing capacity and resources to support their snapshot efforts. These differing levels influenced what they are able to accomplish on their own, as well as limit the scale at which they measured selected metrics. It is important to recognize and respect these inherent, site-based technical and resource disparities.
- There is a shift happening across Hawaiʻi toward co-management of natural resources; the watershed snapshot process supports this effort directly, but in a non-threatening and constructive way. Government partners who supported site-based snapshots see the value of this collaborative work and approach.
- There is clearly a potential to use the watershed snapshot results to communicate with targeted decision makers, which could result in important policy and behavior changes.
- The snapshot process connects families/communities to the land and sea. This is an important social benefit of the process.
- The snapshot process helps to identify traditional knowledge sources that are highly valuable and should be documented before being lost.
- The snapshot project highlights how local communities in Hawaiʻi care deeply about the health of their watersheds and natural surroundings.
- It is clear from this project that both the youth and the elders need to become more engaged and involved in watershed management.
- There is a lack of adequate (or any) baseline data at some watershed sites on certain metrics. At a minimum, it will be important to document (record/video) elder knowledge on these metrics in place of missing historical data. Kupuna knowledge and stories can serve to be as valuable to local communities and historical baseline data collected by outsiders.

KEY FINDINGS

The following section presents key findings identified by the Hā'ena, Hau'ula/Punalu'u, and Maunalua volunteer sites. Key findings are organized into two sub-sections: general recommendations versus advice offered to sites that are thinking about conducting a watershed snapshot in the future.

GENERAL RECOMMENDATIONS

- To understand your watershed's health, you need to look at the whole ecosystem (systems-scale), including people within the ecosystem (i.e., consider both biological and socio-cultural metrics).
- Make sure efforts to manage watersheds are grounded in the priorities and cultural values of the local community. While government interests and outside missions may be important, they should support the local vision.
- Go slow and think carefully about the metrics to be used; don't try to measure too many of them. Measure metrics that are tied closely to the community vision and local priorities, and are culturally relevant.
- Recruit the most appropriate community leaders to support a long-term commitment to measuring and monitoring selected metrics; multiple snapshots must be taken through time to tell your story.
- Invite youth into the watershed snapshot process, including the coordination and administration of the snapshot efforts/activities; this will help to 'grow' long-term support to maintain the snapshot process, and tie to local school projects and ('aina-based) curricula/teaching materials. Create opportunities for schools (K-12; college) and youth groups to get involved in collecting data; use social media and digital tools to grow their interest.
- Bring snapshot sites together every year or two to share lessons and compare results of snapshot metrics.
- If your end-game for participating in the watershed snapshot process is to influence decision making or change policy, then select and focus primarily on those watershed health metrics that will support this end-game.
- The watershed snapshot process is empowering for Hawai'i's local communities; supports them to take action, and can serve as a 'unifier' tool to spur local collaboration between partners around a shared goal (e.g., improving water quality by collaboratively collecting water quality metric and messaging the results with decision makers).
- The watershed snapshot process can link up groups doing work across the ahupua'a; for example, upland/mauka restoration efforts with marine/makai management activities.

SPECIFIC ADVICE OFFERED IN CONDUCTING A WATERSHED SNAPSHOT

- Make sure that your community/site identifies its priority goals at the start of the snapshot process; select appropriate metrics based on these goals.
- Identify one or two (at most) target audiences to focus on communicating with early on in the snapshot process; focus on developing key messages with this audience rather than trying to communicate with all/too many audiences.
- Make sure that all of your community/site representatives fully understand which metrics you have selected, and how these metrics relate to the community's vision and priorities/interests.
- Find professional partners that have the necessary technical skills and expertise to support your choice of metrics. Reach out and invite these partners to make their skills and technical resources available locally to your community. Keep a list of skills and technical resources available, and share with other watershed snapshot sites. Create a process to effectively connect technical resources and skills with local communities, around specific metrics (i.e., technical metric teams).
- Identify what the key messages are that you want to share with local youth and children, and then translate these into simple and easy-to-understand language. For example, if the selected metric is "freshwater availability" and/or "water quality", key messages shared with youth should be "water is valuable; water is a necessity" and "conserve water, turn off the tap".
- Use multiple metrics to link messages. For example: if water diversion to urban centers is limiting local agricultural production, then show this through "locally-grown food availability" and "abundance of freshwater" or "average annual rainfall" and how these metrics are linked.

SPECIAL BRIEFING

HCA'S FUTURE ENGAGEMENT WITH COMMUNITIES AND SITE-BASED PROJECTS

Findings from a HCA Membership Questionnaire

During 2016, HCA members participated in an anonymous online questionnaire designed to solicit member input regarding their perspectives and suggestions on HCA's current and potential future engagement with communities and stakeholders at the site level in Hawai'i, including the CWS project. Over a 3-week open response period, 24 of the 47 invited official HCA member organization representatives responded to the questionnaire (i.e., a 51% response rate; expected online response rates for self-administered questionnaires average between 20 to 35%). The summary results of the questionnaire were used to inform HCA Member discussions regarding the future engagement of HCA with communities and site-based projects.

Results from the HCA membership questionnaire on current and future engagement with communities and site-based projects can be summarized as follows:

- Generally speaking, more than three-quarters of respondents believe that HCA's current efforts aimed at engaging with communities and site-based conservation efforts are either "somewhat" or "very" useful in strengthening people's relationships with their natural environment.
- More than three-quarters of HCA member respondents also either "agree" or "strongly agree" that HCA should continue directly engaging and working with communities and stakeholders at the site level in the future.

Suggestions provided by members regarding how HCA should engage communities and sites in the future can be summarized as follows:

- HCA should focus future efforts on supporting existing member organizations (e.g., KUA) whose mission is aimed at working consistently at the community level.
- HCA should only work with communities when "invited."
- HCA should work to "inspire" and "build capacity" within communities, but not become "hands-on" management partners at a site level.
- HCA should work to engage communities and local stakeholders statewide under a "higher-level, strategic role"; for example, "connecting communities with appropriate technical resources through HCA members."

Following member discussions at Executive Committee and Community Subcommittee meetings, the following key findings were agreed upon by HCA's Steering Committee:

- HCA reaffirms its commitment to engage with and support the critical natural resource conservation work being done by communities at the site level.
- HCA will continue to advance and support the concept of community-based conservation and adaptive collaborative (co-)management in Hawai'i. As part of this, HCA will widely communicate and share its "Collaborative Management of Biocultural Resources in Hawai'i" position paper with relevant audiences.
- HCA has invited and confirmed KUA as a formal HCA member, in part to assist with leading HCA's future engagement and site-based support of communities, including through co-management.
- HCA will clarify its future approach and strategic directions in engaging and supporting community-based conservation efforts as part of a wider HCA strategic planning effort that will be conducted during late 2016 and early 2017, following the hire of HCA's new Executive Director.

APPENDIX I

SUMMARY LESSONS SHARED BY HĀ'ENA

Effective *ahupua'a* management is a "3-legged stool" of different actors, requiring all three legs to be connected and working together in order to support the "weight" of watershed management. These "3 legs" of differing actors are:

1. **Community** (have the depth of knowledge and connection to place)
2. **Non-governmental organizations** (have supporting human and financial capacity)
3. **Government** (including academia; can be informed to change or create policy)

Utility of the watershed snapshot in Hā'ena includes:

- Integration of traditional Native Hawaiian storytelling with modern (digital; social media) storytelling.
- Encourages succession planning (transition of people, process) to encourage natural resource sustainability.
- Helps to clarify of roles and representation needed for communities to fully engage and participate in watershed management efforts.
- Consider branding of watershed for local residents to most effectively receive key messages; use local terms and native language to convey.
- Increases community outreach through volunteerism; garners more local support from outside donors and policy makers.
- Communications products (posters, flyers, videos) help to facilitate change in local residents' behavior. People can see themselves as part of the solution for improved local watershed management.

below: **'Hā'ena Community Consultation, Kaua'i September 2013**

SUMMARY LESSONS SHARED BY HAU'ULA TO PUNALU'U

- More clarity on how data and messages are best delivered/received within the community would be useful.
- Need better idea regarding data availability across metrics.
- Media (especially digital design) and communications expertise is valuable. Maps and visuals (such as posters and videos) are effective products.
- Follow-up on metrics measurement methods is needed to keep data quality high and keep local volunteers engaged and motivated.
- It is valuable to have a single and consistent (through time) point of contact within the community to represent the snapshot efforts locally. In some cases, a retired volunteer may be a better choice than a busy, working professional.
- Bring participating communities together annually to meet and discuss their snapshot efforts, share results; this is an invaluable learning and networking opportunity for participating sites. Serves as a learning experience.
- Teaching and exchange of skills from *kupuna* (elders) to *keiki* (youth) can be a useful way to encourage participation under the snapshot. We need ways to maintain communication and share stories between *kupuna* (as the "lost generation") and today's youth.

above: **Hau'ula Community Consultation, Hau'ula, 'Oahu, September 2013**

below: **Dotty Kelly-Paddock Community Watershed Snapshot Lessons Learned Pavillon Presentation, IUCN 2016 World Conservation Congress, Honolulu, 'Oahu September 2016**

top left: **Maunalua Community Consultation, Hawai'i Kai, O'ahu, September 2013**
bottom left: **Chris Cramer, Community Watershed Snapshot Lessons Learned Pavillon Presentation, IUCN 2016 World Conservation Congress, Honolulu, O'ahu, September 2016**
right: **Maunalua Communications Engagement Meeting, Hawai'i Kai, O'ahu, March 2016**

APPENDIX I (CONT.)

SUMMARY LESSONS SHARED BY MAUNALUA

- The watershed snapshot process takes a long time to do; not a quick "snapshot". Be careful not to loose momentum or interest over time.
- Be sure that the representative from your community group participating in the snapshot process reports back regularly to the rest of your team/NGO; otherwise, they will not know what the snapshot is all about.
- Each participating NGO/community group at the site level should have a rotating representative within the snapshot process; to encourage wider awareness and participation in the snapshot locally.
- Be aware that local volunteers/community representatives usually have day jobs (unless they are retired), so cannot participate in snapshot workshops/ meetings during weekdays/working hours.
- Some metrics are technically difficult for local communities to collect; for example, water quality. Requires necessary training, technical support from an appropriate member/scientist, and ample lead-time to conduct periodically. Not always easy to logistically carry out.
- Note that community volunteers stay involved in the snapshot through time, whereas local NGO staff (hired) may move to another job/organization, so creates a higher level of turn over in the process. Don't rely on NGO staff.
- Some of the highest value/greatest benefit for our site was the opportunity to meet with and learn from other snapshot sites; do more learning exchanges.
- *Kupuna* are often private and may not easily share or communicate with non-family members; best to work through family members in terms of facilitating their inputs in the snapshot process.
- It is important to tie your watershed snapshot site metrics to local educational efforts and schools; figure out how to make this tie into local educational efforts, and how to message with educators and students appropriately about the snapshot.
- Snapshot site teams should go to neighborhood board meetings to present results and share snapshot findings as they are updated.

APPENDIX II

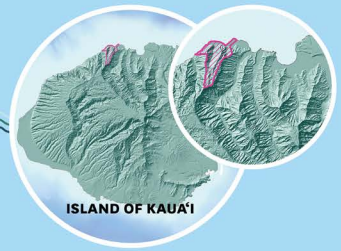
COMMUNITY WATERSHED SNAPSHOT

COMMUNICATION TOOLS

Hā'ena Ahupua'a Snapshot

LOCAL MEASURE OF *MAUKA*-TO-*MAKAI* HEALTH

The Watershed Snapshot project is a status report on ridge-to-reef health. In consultation with the Hawai'i Conservation Alliance, communities across the State identified metrics that would best define the health of their area, including socio-economic and cultural variables. In 2016, available data from researchers and resource management organizations were compiled to inform the selected metrics. Results are housed as a public resource in an online library of all related watershed-related data, and can be found at hca.maps.arcgis.com. The information is compiled as a suite of communication tools to help inform, guide, and garner support for more effective *mauka*-to-*makai* management efforts. Visit www.hawaiiconservation.org/communitysnapshot for more information.



"THE KŪPUNA TELL US THERE IS LESS WATER IN THE STREAMS, AND THE SCIENTISTS TELL US THAT NOT ONLY IS THERE LESS RAINFALL, BUT THE SPREAD OF INVASIVE TREES MEANS THE FOREST HOLDS ONTO EVEN LESS WATER THAN THEY USED TO. WE NEED HEALTHY FORESTS TO ENSURE THAT HĀ'ENA STILL HAS CLEAN, FLOWING WATER IN THE FUTURE."
- KAWIKA WINTER, DIRECTOR LIMAHULI GARDEN AND PRESERVE

76 DOCUMENTED SACRED PLACES (*WAHI PANA/KAPU**)

NATIVE BIRD DIVERSITY
SEABIRDS >> 6
FOREST BIRDS >> 5
WATER FOWL >> 4
SHORE BIRDS >> 3

NATIVE PLANT DIVERSITY
TOTAL >> 275
FEDERALLY LISTED >> 43
PEPP >> 9
(PLANT EXTINCTION PREVENTION PROGRAM)

43% NATIVE FOREST COVER (2011)

MĀNOA*

LIMAHULI*

MAKANA*

KE-AHU-A-LAKA*

KĒ'Ē*

ALMOST HALF OF THE 45 TOTAL CESSPOOLS ARE 200 FT FROM A STREAM OR SHORELINE

WELL LOCATION

RESTORED *HALE*

RESTORED *HALE*

WATER QUALITY MONITORING STATION

MAKUA*

"THE OLD HAWAIIANS WOULD SAY, 'HANA KA LIMA, 'AI KA WAHA.' WE NEED TO WORK TO TAKE CARE OF THIS PLACE SO THAT WE CAN CONTINUE TO FEED OUR FAMILIES."
- TOM HASHIMOTO, LIVING KUPUNA

E HO'OMALU KĀKOU I KA 'ĀINA
(WE MUST PROTECT THE 'ĀINA)
- RACHEL MAHUIKI, KUPUNA (1913-1996)

53% CORAL COVERAGE
(10%-50% DENSITY)

COMMUNITY-BASED SUBSISTENCE FISHING AREA (DESIGNATION 2006)
RULES ADOPTED 2015 // MONITORING INITIATED 2016
INCLUDES THE FIRST NEAR-SHORE *PU'UHONUA* IN HAWAI'I

TOURISTS >> ~1,000,000/YEAR

RESIDENTS >> 1,985 (2010)

PREK-12 EDUCATION >> 600 (2015)

VOLUNTEERS >> 131 (2015)

MĀLAMA 'ĀINA CAREERS >> 18 (2016)

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Hawai'i Conservation Alliance FOUNDATION

#HAENALAWAIAPONO

LIMAHULI GARDEN & PRESERVE
#LIMAHULI
#UPPERLIMAHULIPRESERVE

Hā'ena Watershed Snapshot 2016

TARGET FOOD FISH

Community-Based Subsistence Fishing Area

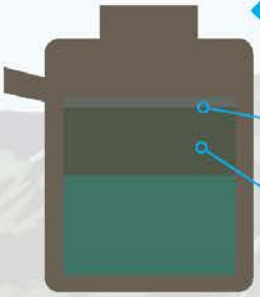
Established 2006 // In 2016 became the first CBSFA to have rules adopted. // Monitoring Initiated 2016 // **INCLUDES THE FIRST NEAR-SHORE PU'UHONUA (REFUGE) IN HAWAI'I**

AVERAGE ANNUAL RAINFALL

"The kūpuna tell us there is less water in the streams, and the scientists tell us that not only is there less rainfall, but the spread of invasive trees means the forest holds onto even less water than they used to. We need healthy forests to ensure that Hā'ena still has clean, flowing water in the future."

- KAWIKA WINTER, DIRECTOR LIMAHULI GARDEN AND PRESERVE

WATER QUALITY



3 of 45 Cesspools are within 200 feet of a stream.

18 of 45 Cesspools are within 200 ft of the coastline.

76 DOCUMENTED SACRED PLACES (*WAHI PANA/KAPU*)

RESIDENT AND VISITOR POPULATION (2010-15)

1,985 Resident Population

THE 1900 CENSUS RECORDED SEVEN HOUSEHOLDS IN HĀ'ENA, ALL OF WHICH WERE COMPRISED OF NATIVE HAWAIIANS. IN 2010, THE CENSUS RECORDED 332 RESIDENCES, 23% OF WHICH IDENTIFIED AS NATIVE HAWAIIAN AND 43% WERE LISTED AS SEASONAL/VACATION USE.

~1,000,000 visitors/year

COMMUNITY INVOLVEMENT (2010-15)

131 Volunteers

18 Mālama 'Āina Careers

NATIVE VEGETATION (2011)

Native Forest Cover **43%**

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LIMAHULI GARDEN & PRESERVE
National Tropical Botanical Garden

#LIMAHULI
#UPPERLIMAHULIPRESERVE

Hau'ula to Punalu'u Watershed Snapshot

LOCAL MEASURES OF *AHUPUA'A* HEALTH

The Watershed Snapshot is a status report on the health of our *ahupua'a*, or watershed. In consultation with the Hawai'i Conservation Alliance, communities across the state identified metrics that would best define the health of their *ahupua'a*. Available data from resource management organizations was compiled to inform the selected metrics, and communities also collected socio-economic, and local *kūpuna* (elder) knowledge. An online library of all available watershed related data has been created as a public resource and can be found by visiting hca.maps.arcgis.com. The information compiled in a suite of communication tools will help inform, guide and garner support for increasing *mauka* to *makai* management efforts. Visit www.hawaiiconservation.org/communitysnapshot for more information.

"THE KŪPUNA TELL US THERE IS LESS WATER IN THE STREAMS, AND THE SCIENTISTS TELL US THAT NOT ONLY IS THERE LESS RAINFALL, BUT THE SPREAD OF INVASIVE TREES MEANS THE FOREST HOLDS ONTO EVEN LESS WATER THAN THEY USED TO. WE NEED HEALTHY FORESTS TO ENSURE THAT HAU'ULA STILL HAS CLEAN, FLOWING WATER IN THE FUTURE."
- KAWIKA WINTER, PH.D.
NATIONAL TROPICAL BOTANICAL GARDEN

'IWA (FREGATA MINOR)

RAIN GAUGE STATION

PUNALU'U STREAM

27% NATIVE FOREST COVER (2011)

KŌLEA (PACIFIC GOLDEN PLOVER)

RAIN GAUGE STATION

HEIAU

ALMOST HALF OF THE 698 TOTAL CESSPOOLS ARE 200 FT FROM A STREAM OR SHORELINE

KALUANUI STREAM

MAUNAWILA HEIAU

WATER QUALITY MONITORING STATION

MA'AKUA STREAM

KAIPĀPA'U STREAM

WAIPILOPILO STREAM

HEIAU

HEIAU

WATER QUALITY MONITORING STATION

RAIN GAUGE STATION

WATER QUALITY MONITORING STATION

PUEO (HAWAIIAN SHORT EARED OWL)

HEIAU

'AUKU'U (BLACK CROWNED NIGHT HERON)

"THE NUMBERS OF NEAR SHORE REEF FISH SUCH AS UHU HAVE DECREASED OVER THE YEARS LIKELY DUE TO A COMBINATION OF FACTORS INCLUDING A LOSS OF CORAL HABITAT, OVER HARVESTING OF FISH, AND DECREASED WATER QUALITY FROM POLLUTION SUCH AS SEDIMENT RUNOFF FROM LAND"
- NOAA FISHERIES, PACIFIC ISLANDS REGIONAL OFFICE

43% CORAL COVERAGE (10%–50% DENSITY)

"THE OCEANS NEEDS TO DRINK. THE ZONE WHERE THE WAI (FRESHWATER) FROM THE LAND MEETS THE KAI (OCEAN WATER) IS WHERE THE LIMU GROWS, AND IS THE NURSERY FOR MARINE AND STREAM LIFE. WE NEED GOOD QUALITY WATER FLOWING FROM MAUKA SO THAT THE OCEAN CAN BE FULL OF FOOD."
- UNCLE HENRY CHANG WO, LIMU LOEA (EXPERT), (1941 - 2015)

RESIDENT POPULATION: 5,439 (2010)

VOLUNTEERS: 2,650 (2010-15)

13 NATURAL RESOURCE MANAGEMENT PROJECTS (SINCE 2010)

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Hawai'i Conservation Alliance FOUNDATION

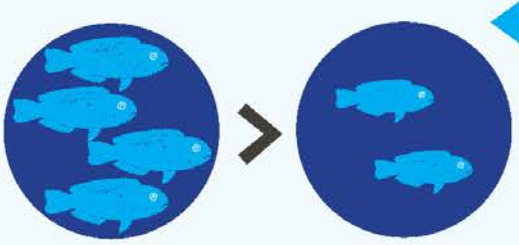
NOAA

HCA HAU'ULA COMMUNITY ASSOCIATION

WWW.HAUULACOMMUNITYASSOCIATION.NET

Hauʻula to Punaluʻu Watershed Snapshot 2016

TARGET FOOD FISH



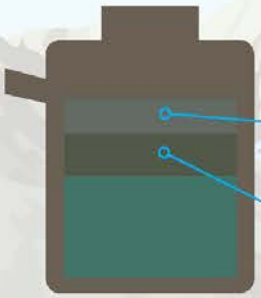
The numbers of near shore reef fish such as *Uhu* have decreased over the years likely due to a combination of factors including a loss of coral habitat, over harvesting of fish, and decreased water quality from pollution such as sediment runoff from land - NOAA FISHERIES, PACIFIC ISLANDS REGIONAL OFFICE

AVERAGE ANNUAL RAINFALL

"The *kūpuna* tell us there is less water in the streams, and the scientists tell us that not only is there less rainfall, but the spread of invasive trees means the forest holds onto even less water than they used to. We need healthy forests to ensure that Hauʻula still has clean, flowing water in the future."

- KAWIKA WINTER, PH.D.
NATIONAL TROPICAL BOTANICAL GARDEN

WATER QUALITY



121 of 698 Cesspools are within 200 feet of a stream.

201 of 698 Cesspools are within 200 ft of the coastline.

MARINE INVERTEBRATES AND ALGAE

"The oceans needs to drink. The zone where the wai (freshwater) from the land meets the kai (ocean water) is where the limu grows, and is the nursery for marine and stream life. We need good quality water flowing from mauka so that the ocean can be full of food."

– UNCLE HENRY CHANG WO, LIMU EXPERT, 1941 - 2015

RESIDENT POPULATION (2010)

5,439

HAUʻULA'S POPULATION IN 2010 WAS 4,275 AND PUNALUʻU WAS 1,164
LAND AREA FOR HAUʻULA IS 1.2 SQ MI AND FOR PUNALUʻU IS 2.1 SQ MI

COMMUNITY INVOLVEMENT (2010-15)

13 Natural Resource Management Projects

2,650 Volunteers

NATIVE VEGETATION (2011)

Native Forest Cover **27%**

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HCA HAUʻULA COMMUNITY ASSOCIATION
WWW.HAUULACOMMUNITYASSOCIATION.NET

Maunalua Watershed Snapshot

LOCAL MEASURES OF *AHUPUA'A* HEALTH

The Watershed Snapshot is a status report on the health of our ahupua'a, or watershed. In consultation with the Hawai'i Conservation Alliance, communities across the state identified metrics that would best define the health of their ahupua'a. Available data from resource management organizations was compiled to inform the selected metrics, and communities also collected socio-economic, and local kūpuna (elder) knowledge. An online library of all available watershed related data has been created as a public resource and can be found by visiting hca.maps.arcgis.com. The information compiled in a suite of communication tools will help inform, guide and garner support for increasing mauka to makai management efforts. Visit www.hawaiiconservation.org/communitysnapshot for more information.

"OVER THE PAST 90-100 YEARS, RAINFALL IN HAWAI'I HAS SLOWLY DECLINED OVERALL. WHILE THE EFFECTS OF GLOBAL WARMING ON HAWAIIAN RAINFALL ARE STILL UNCERTAIN, EVIDENCE SUGGESTS DECREASES IN SOME AREAS WILL CONTINUE."
- DR. TOM GIAMBELLUCA, PROFESSOR, UNIVERSITY OF HAWAI'I

KULI'OU'OU VALLEY

RAIN GAUGE STATION

MAUNA O AHI

KA'ALAKEI VALLEY

HAHA'IONE VALLEY

KALUANUI

KAMILONUI VALLEY
87 ACRES OF AGRICULTURAL LAND

PUEO

KAMILOIKI VALLEY

KOHELEPELEPE, PU'U MA'I (KOKO CRATER)

KALAMA VALLEY

7% NATIVE FOREST COVER (2011)

HAWEA HEIAU COMPLEX & KEAWAWA WETLAND

WATER QUALITY MONITORING STATION

RAIN GAUGE STATION

PAHUA HEIAU

ALAE'ULA

26% IMPERVIOUS SURFACE THAT DOES NOT ALLOW SURFACE WATER TO PENETRATE

KANEWAI SPRING ~840K GALLONS OF FRESH WATER PER DAY INTO THE BAY

WATER QUALITY MONITORING STATION

WATER QUALITY MONITORING STATION

WATER QUALITY MONITORING STATION

HAWAI'I KAI MARINA (KE AHUPUA O MAUNALUA)

PAIKO LAGOON STATE WILDLIFE SANCTUARY

MAUNALUA BAY
28 ACRES OF INVASIVE ALGAE REMOVED. MORE THAN 3.5 MILLION POUNDS HAVE BEEN RECYCLED AS SOIL AMENDMENT AT LOCAL FARMS. ONE OF THE LAST FEW PLACES WHERE *HALOPHILA*, NATIVE SEAGRASS GROWS IN HAWAI'I. - MALAMA MAUNALUA

25% OF 1,655 TOTAL CESSPOOLS ARE 200FT FROM A STREAM OR SHORELINE

← KALAUHA'IHA'I FISHPOND

KA IWI COAST →

THE GREAT FISHPOND OF KEAHUPUA O MAUNALUA WAS NOTED FOR BEING THE LARGEST SALTWATER FISHPOND IN ALL OF POLYNESIA. TODAY, THE RENEWAL OF ANCIENT MULLET PONDS AT KALAUHA'IHA'I AND KANEWAI GIVES US NEW HOPE AS WE UPHOLD THIS RICH LEGACY OF HAWAIIAN OCEAN FARMING."
- CHRIS CRAMER, CO-FOUNDER, MAUNALUA FISHPOND HERITAGE CENTER

"WHEN I WAS LITTLE OUR YARD IN NIU INCLUDED KALAUHA'IHA'I SPRING. ON ITS EWA SIDE WAS A SMALL PASTURE WITH DAIRY COWS AND HORSES. THOSE ANIMALS DRANK FRESH WATER FROM THE POND. WATER IN THIS VALLEY TRAVELS FROM THE MOUNTAINS IN BIG LAVA TUBES."
- LAURA LUCAS THOMPSON, KUPUNA FROM NIU

"WETLANDS, SERENE AND UNNOTICED, HAVE A POWERFUL INFLUENCE OVER LAND AND SEA ALIKE. THEY REPLENISH GROUNDWATER, PROTECT CORAL REEFS, AND PROVIDE HABITAT FOR ENDEMIC WILDLIFE LIKE THE 'ALAE'ULA."
- CHARLES VAN REES, ADVISORY ECOLOGIST, LIVABLE HAWAI'I KAI HUI

RESIDENT POPULATION: 207,400 (2010)

VOLUNTEERS: 12,973 (2010-15)

53 NATURAL RESOURCE MANAGEMENT PROJECTS (2010-15)

Hawai'i Conservation Alliance FOUNDATION

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HAWAI'I CONSERVATION ALLIANCE

Livable Hawai'i Kai Hui
WWW.HAWAIIKAIHUI.ORG

MAUNALUA FISHPOND HERITAGE CENTER

mālama maunalua
WWW.MALAMAMAUNALUA.ORG

Maunalua Watershed Snapshot 2016

TARGET FOOD FISH

"The great fishpond of Keahupua o Maunalua was was noted for being the largest fishpond of its kind in Polynesia. Today, the renewal of ancient mullet ponds at Kalauha'iha'i and Kānewai gives us new hope as we uphold this rich legacy of Hawaiian ocean farming."

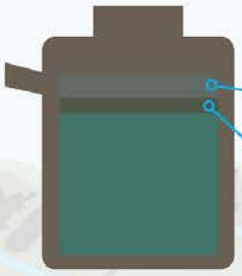
- CHRIS CRAMER, CO-FOUNDER, MAUNALUA FISHPOND HERITAGE CENTER

AVERAGE ANNUAL RAINFALL

"Over the past 90-100 years, rainfall in Hawai'i has slowly declined overall. While the effects of global warming on Hawaiian rainfall are still uncertain, evidence suggests decreases in some areas will continue."

- DR. TOM GIAMBELLUCA PROFESSOR, UNIVERSITY OF HAWAI'I

WATER QUALITY



248 of 1,655 Cesspools are within 200 feet of a stream.

165 of 1,655 Cesspools are within 200 ft of the coastline.

MARINE INVERTEBRATES AND ALGAE

One of the few places where **Halophia, native seagrass,** grows in Hawai'i.

Invasive algae removed from **28 Acres**

207,400 RESIDENT POPULATION (2010)

COMMUNITY INVOLVEMENT (2010-15)

53 Natural Resource Management Projects

12,973 Volunteers

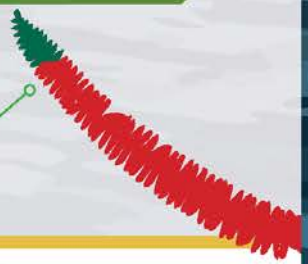
LAND COVER

26%

Impervious surface that does not allow surface water to penetrate

NATIVE VEGETATION

Native Forest Cover **7%**



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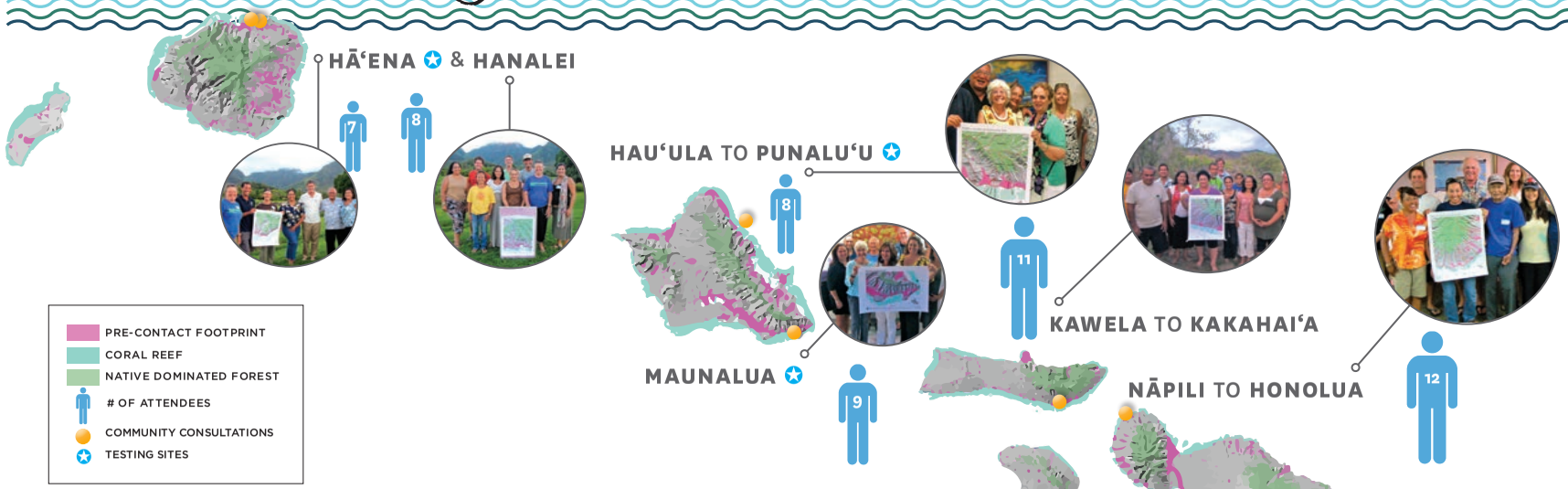
MAUNALUA FISHPOND HERITAGE CENTER

mālama maunalua

WWW.MALAMAMAUNALUA.ORG

The Community Watershed Snapshot

HAWAIʻI CONSERVATION ALLIANCE



WATERSHED HEALTH MAP

A publicly accessible product of the HCA Online Mapping Tooland a key deliverable of this project pools all agency data related to conservation of watersheds in Hawaiʻi. Visit the Watershed Health Web Map!

hca.maps.arcgis.com

HAWAIʻI CONSERVATION ALLIANCE // 1601 EAST-WEST, #2041, HONOLULU, HAWAIʻI 96848
WWW.HAWAIICONSERVATION.ORG // (808) 944-7417 // COORDINATOR@HAWAIICONSERVATION.ORG

HAWAIʻI CONSERVATION ALLIANCE

A Partnership Dedicated to Environmental Stewardship, Community Engagement, and Conservation Capacity

LOCAL MEASURES OF AHUPUAʻA HEALTH

Hawaiʻi Conservation Alliance Watershed Snapshot is a status report on the health of our watersheds for decision makers and communities. The analysis uses geospatial agency data and select information gathered by participating communities to inform development of a suite of communication tools to advance mauka to makai (mountain to sea) management efforts.

PROGRESS TO DATE

In 2013, Hawaiʻi Conservation Alliance HCA consulted with local leaders and stakeholders from eight communities across the main Hawaiian Islands on how best to measure the health of local watersheds. Community representatives identified a set of mauka (terrestrial), makai/wai (ocean/fresh water), and na'ike (social-economic) factors that they believe are important in understanding the status ("snapshot") of the health of their ahupuaʻa. Following formal review and consideration by HCA members, a set of Watershed Snapshot Metrics were endorsed by HCA in 2014. During 2015 and 2016, volunteer communities begun to implement the watershed snapshot activities. Participating communities aim to use the information captured through the watershed snapshot measures to inform and advance their community-based natural resource management efforts.

NEXT STEPS

- For each of the 3 communities Haʻena on Kauaʻi, Maunalua and Hauʻula on Oʻahu complete design and print of communication tools in consultation with communities (poster, infographic, factsheet, power point presentation)
- Conduct Lessons Learned workshop on July 29th with participating communities and HCA members and partners.
- Document process to build capacity for other communities wishing to do similar evaluation of their watersheds, via a guidebook or how to guide.

WATERSHED SNAPSHOT METRICS

BIOPHYSICAL
Rainfall (rain and stream gauges- NOAA-Weather)
Availability Of Fresh Water (# of water sources/household(or capita), Board of Water Supply)
Water Quality (Stream sediment, flow, pathogens)
Groundwater Recharge, Land Use (% Impermeable Surface, ratio of developed over natural)
Native Vegetation (% trees/plants cover, acres)
Key Bird Species (Presence, abundance, compare historic)
Target Food Fish (Biomass, Fishing Effot, Size Structure)
Ocean Habitat Quality (Coral: abundance & biodiversity; sand; rubble etc)
Marine Invertebrates & Algae (Indicators of water or habitat quality)
Freshwater: Food Fish & Key Invertebrates (see fish and invertebrate above)

SOCIO-CULTURAL
Population Size and Growth (DBEDT)
Cultural (# of kūpuna, # families persist, presence of loʻi, traditional fishing)
Health/Diet (Prevalence of diabetes, heart disease, obesity, drug abuse; # of farmers/fish markets)
Community Involvement in Natural Resource Management (# of people, # of projects, # of organizations , # schools, etc)

above: **Watershed Snapshot Communication Engagement in Hāʻena** *top left:* **Water quality collection for Maunalua** *bottom left:* **Site planning workshop in Kawela on Molokaʻi**

ALLIANCE PARTNERS

Bishop Museum // Hawai ʻi Association of Watershed Partnerships // Hawai'i Department of Agriculture // Hawai'i Department of Land and Natural Resources: Division of Aquatic Resources // Hawai'i Department of Land and Natural Resources: Division of Forestry and Wildlife // Hawai'i Invasive Species Council // Kamehameha Schools // National Park Service // National Oceanic and Atmospheric Administration: National Marine Fisheries Service // National Oceanic and Atmospheric Administration: Pacific Services Center // National Oceanic and Atmospheric Administration: Office of National Marine Sanctuaries // National Tropical Botanical Garden // The Nature Conservancy Hawai'i // Office of Hawaiian Affairs // Pacific Islands Climate Change Cooperative // Pacific Islands Climate Science Center // University of Hawai'i at Hilo // University of Hawai'i at Mānoa: Centerfor Conservation Research and Training // U.S. Department of Agriculture: Forest Service Institute of Pacific Island Forestry // U.S. Department of Agriculture: Forest Service Pacific Southwest Region // U.S. Department of Agriculture: Natural Resources Conservation Service // U.S. Department of Defense, Army Garrison Hawai'i: Natural Resource Program // U.S. Fish and Wildlife Service: Ecological Services // U.S. Fish and Wildlife Service: National Wildlife Refuge Complex // U.S. Geological Survey: Pacific Island Ecosystems Research Center