

# **Hawai‘i Island Manager Needs Assessment Report**

## **UH Hilo Manager Climate Corps**

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### **Context from Study Area**

Communities on the island are highly localized, experience a wide range of ecosystems and climate regimes, and are characterized by extensive histories of indigenous Hawaiian and immigrant cultures (McMillen et al. 2016). These highly complex geopolitical landscapes and seascapes result in a diversity of landowners and political arenas interacting in close proximity on the island, including NGOs, federal, state, county, and private organizations. This socio-ecological assemblage makes the island a representative site for other locations working to be resilient and adaptive under a changing climate.

### **Approach**

To create the foundation for UH Hilo climate research efforts, we conducted a needs assessment of local managers on Hawai‘i Island to guide subsequent knowledge coproduction networking (Fig. 1). We deliberately predicated our methodologies on first understanding individual managers’ perceptions, norms, values, needs, information sources, experiences (collectively their worldviews), and the professional networks managers currently utilize. Our manager selection process engaged individuals that would likely be directly involved in the long-term future of natural resources on the island.

While there is a national focus on conducting “stakeholder-driven” science, our review of research efforts in the U.S. indicated that managers, decision makers, stakeholders, and end users are frequently poorly defined and management scales are often not clearly outlined (unpublished data). In identifying stakeholders, we chose to interview individuals whose positions are largely focused within Hawai‘i Island and who are directly accountable to explicit areas of land, water, and the surrounding communities that utilize the managed natural resources. We targeted policy implementers, rather than policy makers, as implementers are immediately accountable to discrete areas and communities. Similar to Tribbia and Moser (2008) we defined manager occupations broadly, including those focused on safety, environmental protection, public infrastructure, and development of both terrestrial and marine resources. We focused on managers and policy implementers across a wide range of vocations who experience terrestrial, oceanic, or atmospheric changes due to climate change in their land- or seascape. Henceforth, when referring to the field managers and policy implementers interviewed in our study, we state “managers” for brevity.

In June of 2015, we began 25 semi-structured interviews with managers. We identified managers across a variety of organizations—county, state and federal government, private land managers—as well as managers in different sectors that may be influenced by changing climate (e.g., county planning, agriculture, and infrastructure). We initially interviewed managers in those different organizations and sectors who were familiar with faculty and staff (e.g., recent Masters graduates). Via referral sampling from those people, we then identified additional interviewees. Rather than an exhaustive survey of individuals, this snowball sampling approach enabled us to locate, engage, and build upon existing professional networks. Each interview was based on 10 questions that were sent in advance of the interview (Table 1), and we requested 30-45 minutes for each interview. The questions were intentionally open-ended, and not all questions were covered in each interview to allow the conversation to develop according to the interviewee’s priorities. Each interview was in-person and at the manager’s preferred meeting place with the exception of one phone interview.

Our interview and analysis methodology was exploratory in nature and focused on improving our understanding of managers’ experiential contexts on Hawai‘i Island as foundational perspectives to be presented to university faculty in related fields. Then, long-term transdisciplinary relationships can be initiated as the foundation of knowledge coproduction. Managers and scientists interact in a variety of mutual public and professional forums, however, they are often accountable to very different sectors of society, and their behavior is often driven by differing worldviews. Managers and scientists employ both tacit and articulate perspectives, yet the relative proportions of these perspectives differ in their utilization (Dampney et al. 2002). These factors collectively result in variable underlying goals, outlooks, and needs within conversations (Spradley 2016, Yow 2015). Our exploratory interview process endeavored to improve our understanding of these distinctions through open-ended qualitative manager interviews, which could then guide the integration of manager and scientist perspectives through the development of knowledge coproduction projects.

We selected grounded theory methodologies (Charmaz 2008) for our interview analysis because, like our interview approach, this interactive qualitative analysis places significant emphasis on the interviewee’s perceptions and experiences. Grounded theory analyzes extrinsic and intrinsic communications (language, emotion, unspoken mannerisms, etc.) and allows the interview process to guide theme delineation rather than preconceived concepts or hypotheses. Using qualitative research approaches, we coded and outlined specific themes identified from the interviews, summed them according to the number of managers who described a given theme during the interview, and organized all themes within broader context categories. Additionally, we classified the type of manager (e.g., safety personnel; Fig. 2a, Appendix 1) and scale of areas managed

according to spatial scale and the level of direct resource interaction (i.e., degree of connection with natural resources and human communities regularly affiliated with those resources; Fig. 2a).

## **Results**

Our interviewees manage a geographic range across Hawai‘i Island in roughly equal percentages of coastal and mountain systems (Fig. 1). The native-rich high-elevation systems are largely zoned for conservation land use, while the lower elevations are dominated by non-native species and have mainly human-centered land use (Fig. 1). Wide-ranging management perspectives were heard throughout our interviews discussing native ecosystems (terrestrial and marine), traditional cultural sites, traditional cultural homelands, marine recreation, open ocean harvesting and transport, near-shore safety, ranching, agriculture, county planning, community-based management, fire hazards, and invasive species.

Our manager-based interview approach, including open ended questions and discussion as well as traveling to managers’ areas of work, was universally well received by managers and highly productive. The interview lengths ranged from 45 minutes to 2.5 hours, with most managers providing more than an hour of their time for the exploratory interview process. Many managers verbalized surprise that the interviews’ purpose was to create opportunities to better understand their worldview by listening to their day-to-day experiences, perspectives, and priorities. Some managers mentioned they rarely have the opportunity to share their perspectives with institutional researchers.

In completing our thematic analysis of interviews, we identified 46 independent themes. Five of these themes were mentioned by more than 50% of the interviewees: 1) utilizing professional colleagues as a key source of information; 2) employing personal and institutional observation and practice as sources of knowledge; 3) investing in sustainable communities (both natural and human) as a goal; 4) restoration and conservation of native ecosystems and traditional Hawaiian cultural sites and practices as a goal; and 5) increasing capacity for networking with other professionals on the island as a need. We summarized theme responses to interview questions (Table 1) into the following categories: knowledge sources, goals, challenges, needs, and climate concerns.

### **Interview themes**

Nineteen managers described professional colleagues as their most common source of knowledge, including conferring with scientists in their professional communities or consulting other local experts (Fig. 2b). Internal observations and experiences were mentioned as the second most common source. Structured experimental field designs were common such as trial and error techniques, gathering personal weather data to guide grazing rotations on ranches, monitoring seedling success after varied planting techniques, or noting the efficacy of various herbicide treatments.

Directed by personal, business, or agency mandates, 16 of 25 interviews explicitly stated a goal of working toward sustainable local communities (Table 2). Though human communities were the overall priority within this goal, preserving natural communities was often described as a fundamental element. This pervasive overlap between natural and human communities is evident in that the second common goal described by managers was conservation and restoration of natural landscapes that sustain human communities and cultural, historical, and archaeological sites. Managers strive to involve communities directly in the lands and waters they manage by

supporting recreation, restoration efforts, and food acquisition (farming, ranching, fishing, hunting) to increase personal experience, investment, and, ultimately, value in protecting natural resources. As an example of food acquisition, one couple interviewed operates a small family ranch with the help of five families primarily to allow their children to “learn more about raising their own food and eating their own food. Men are butchering, wives make hamburger, and the kids help”. Table 2 outlines the top five goal categories mentioned by managers and specific examples of each.

Discussion of challenges was a major portion of the interviews overall (Appendix 1, Fig. A1.1b). A universal problem managers encountered was the impacts of environmental hazards such as invasive species, fire, and extreme weather events. Invasive species replace high quality forage for livestock, outcompete native species on reefs, are a public nuisance (e.g., little red fire ants), and can be a major threat to property and human health (e.g., downed nonnative *Falcataria moluccana* tree limbs in hurricane winds). Invasive species can alter fire return intervals and severity by rapidly increasing fuel loads and risk to human safety, infrastructure, and erosion. Another common challenge among managers was dealing with deficits of operational resources (e.g., money, staffing, site access, infrastructure, and sufficient information). Finally, managers’ efforts were inhibited by social and political challenges including archaeological sites spanning political boundaries; pollution and sediment from upstream landowners; conflict among farming, ranching, and conservation; and urban development of agricultural lands. One common bureaucratic pressure was the constant shifting of priorities from administrative and politically influenced offices, leaving many field managers pursuing perpetually fluctuating agendas.

Managers expressed a strong need for increased networking opportunities across a diversity of professional disciplines and organizational levels. Traditional Hawaiian biogeographic land units, called ahupua‘a, were often suggested as management models within which to nest this networking interest across ecosystems (Smith and Pai 1992). Additionally, managers mentioned a need to obtain knowledge from scientists that is usable in both subject scope and spatial/temporal scale, and particularly in relation to climate change impacts.

Climate change research did not play a prevalent role in the day-to-day operations of most managers, but societal awareness of climate change impacts did. A number of managers had recently become aware of potential climate change impacts as such issues are increasingly discussed within their professional networks and within popular culture. Most managers expressed an interest in learning specific climate change shifts predicted for their managed areas in the near future and desired assistance in prioritizing locations of high vulnerability to near-term impacts.

Extreme weather events were the most concerning topic related to climate change impacts. A diversity of managers made it clear that they would greatly benefit from improved information regarding localized shifts in storm frequency and intensity, sea level rise impacts, and future temperature and rainfall regimes, so they could assemble plans for small boat harbor use, cultural or historical sites, fire safety, native and invasive species management, possible flood water or waste water inundation, farmlands, ranchlands, water quality in near-shore reefs and loko i‘a (traditional fishpond systems), coastal erosion, or coastal water safety.

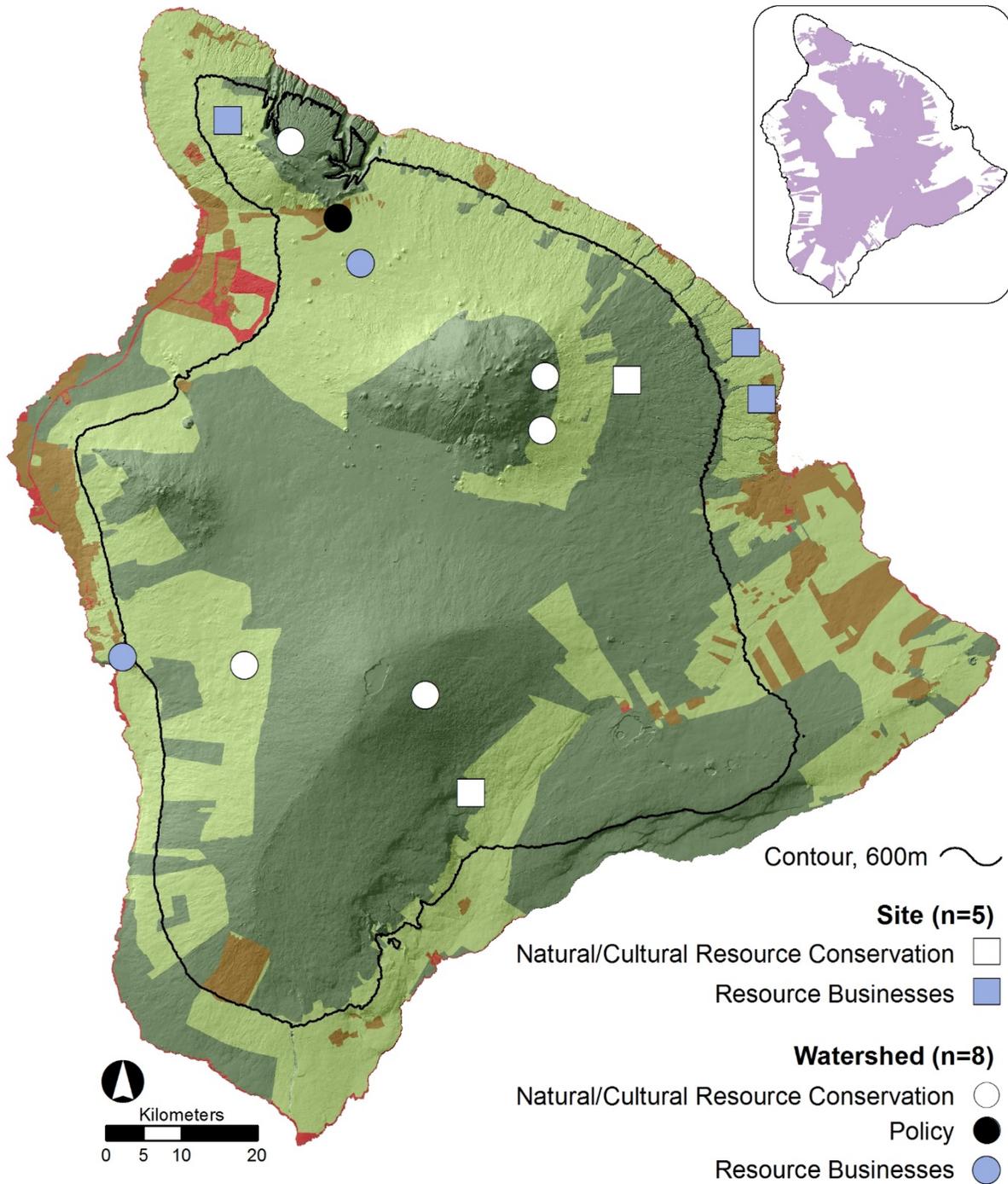
## Summary

Addressing the worldviews of people who live and work in specific lands and waters is the foundation of resilience and adaptation (O'Brien and Selboe 2015). Universities, such as UH Hilo, are poised to play key roles in expanding the adaptive capacities of their local landscapes and communities through facilitating knowledge coproduction networks. Our needs assessment of field managers was a first step to initiate this network focused on climate change across Hawai'i Island. Utilizing needs assessments, Carrier et al. (2012) and our study gathered information from different manager cohorts (Appendix 1), and importantly, both studies reveal that managers in Hawai'i have a strong interest in opportunities to collaborate across disciplines and agencies.

## Literature Cited

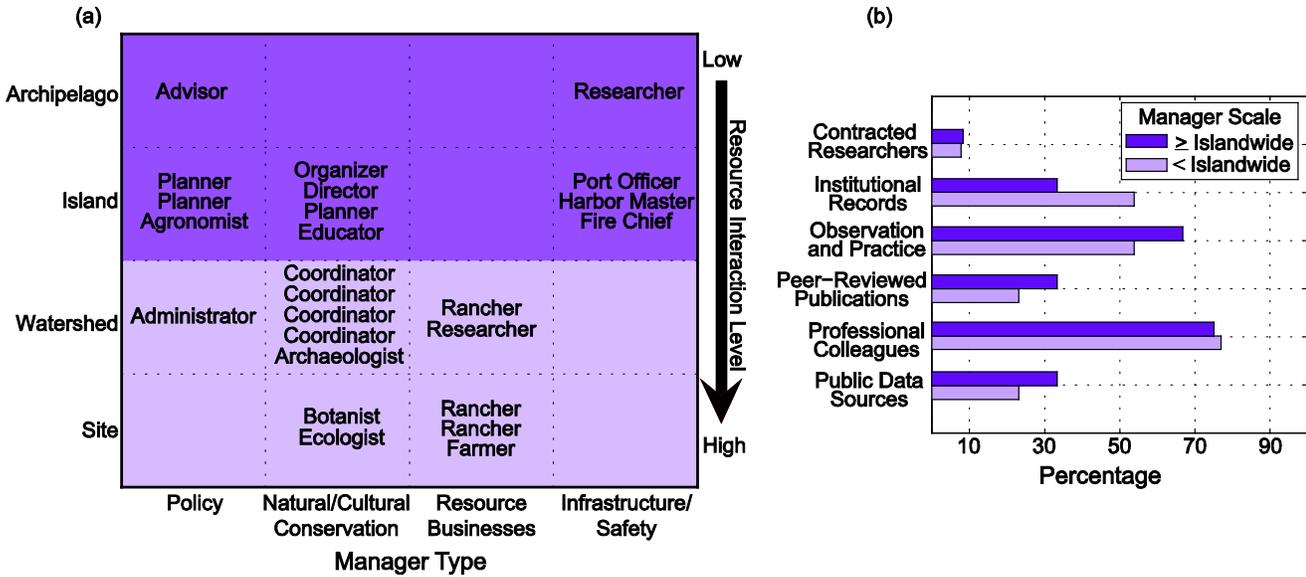
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**Fig. 1** County of Hawai‘i General Plan Land Use Pattern Allocation Guide (Ag = agriculture, Co = conservation, OA = open areas, & De = development; current as of 2012) with 600 meter contour and centroids of land managed by Site and Watershed spatial scale interviewees (n=13). Inset map of area polygon of land jurisdiction for same interviewees. Data courtesy of Interviewees, County of Hawai‘i, NOAA, and State of Hawai‘i Planning Office



	Ag	Co	OA	De	All Classes (km <sup>2</sup> )
Sea Level to 600 m	18%	8%	1%	5%	<b>32% ( 3,337.6)</b>
Higher than 600 m	22%	45%	0%	1%	<b>68% ( 7,092.4)</b>
<b>Island</b>	<b>40%</b>	<b>53%</b>	<b>1%</b>	<b>6%</b>	<b>100% (10,430.0)</b>

**Fig. 2** (a) Spatial representation of managers interviewed and (b) their knowledge sources as discussed in their interviews



**Table 1. Interview questions.**

- What is the personal and professional pathway that led you to your current position?
- How long have you been in your current position?
- Has the area you manage changed over the time you have held this position (stakeholders, policies, numbers of users on the land you manage, etc)?
- How have the above changes influenced or shifted the way you manage?
- Is your site affected by the ocean? If so to what degree? (e.g. not at all, somewhat, greatly)
- Is your site affected by mauka (upslope) activity? (e.g. not at all, somewhat, or greatly)
- Do you use science as a tool to help manage your area? In what way?
- Will the ability to adapt to change be important in your management area in the future?
- Is climate change science involved or considered in the development of your management plans? If so, to what degree and what are your sources for such information?
- What types of information, training, or products regarding resiliency and adaptation in the face of climate change impacts would be useful to you?

**Table 2. Top five goal categories and examples expressed in manager interviews.**

GOALS	EXAMPLES
a) Sustainable Communities	Increasingly utilizing local goods and services Renewable energy projects, particularly wind power
b) Conservation and Restoration of Natural Landscapes that Sustain Human Communities	Ranch and farm lands; promoting traditional Hawaiian farming practices  Native ecosystem restoration efforts that are vital to traditional Hawaiian practices Sustainably harvested local timber Protecting sacred sites for native Hawaiian practice Restore and protect native Hawaiian archaeological sites Restore and protect historic sites
c) Outreach	Teach sustainable resource use through community organizations
d) Community-Based Management	Increasingly involving local and native Hawaiian perspectives in management plans Community watch programs that control poaching and unsustainable resource use
e) Community Involvement in Managed Lands/Waters	Small group food acquisition such as hunting, fishing, gathering, hobby farms/gardens Recreation

## Appendix 1: Hawai‘i Island manager analysis

The managers we interviewed represented a wide range of land and water spatial scales, including site-specific locations to projects across the island and beyond (Fig. 2a). Five interviews involved nearshore and offshore marine interests, including small boat harbor management, marine transportation, and community-based and larger scale fisheries management. One marine manager operates at the archipelago scale; the other four focus on an island scale. County fire fighting also involves significant marine management through their ocean safety division. While operating within a terrestrial purview, county planners focus policy implementation below 600 m in elevation (Fig. 1) and in particular at shoreline setback 12 m from the shore. Remaining interviewees managed terrestrial areas. Collectively our interviewees included federal, state, county, and non-governmental affiliations.

Analysis of the 25 interviews revealed four manager types: policy, natural/cultural resource conservation, resource businesses, and infrastructure/safety. Each manager type displayed distinct foci in goals and challenges (Fig. A1.1). Natural/cultural conservation managers were somewhat aligned in their overall goals with resource business managers, while the policy and infrastructure/safety manager types displayed distinct goals overall. We identified a diversity of challenges, however, deficits in time and money were important challenges across all manager types.

A socio-demographic survey of managers interviewed is listed in Tables A1.1 through A1.3. Although this study resulted in 25 interviews total, 29 individuals were involved in these interviews because four interviews involved two individuals. During these four interviews, both individuals influenced one another as far as the subject matter and interview dynamics overall. We could not effectively separate the integrated perspectives and, therefore, treated each of these four interviews as a singular expression of perspectives. All 29 managers involved in interviews were offered our socio-demographic survey, and 26 individuals responded to the survey. Fifty-nine percent of the 29 individuals involved in interviews were male, and 41% were female.

Table A1.1 Age distribution of managers interviewed on Hawai‘i Island (n=26)

Age Group	Number of Interviewees	Percentage of Interviewees
30-39	8	31
40-49	6	23
50-59	3	11
60-69	8	31
70-79	1	4

Table A1.2 Educational levels among managers interviewed on Hawai‘i Island (n=26)

Education Level	Number of Interviewees	Percentage of Interviewees
High School	2	8
Associates	1	4
Bachelors	9	35
Masters	10	38
PhD	4	15

Table A1.3 Number of years managers have worked on Hawai‘i Island (n=26)

Years Worked	Number of Interviewees	Percentage of Interviewees
1-10	4	15
11-20	12	46
21-30	6	23
31-40	3	12
41-50	1	4

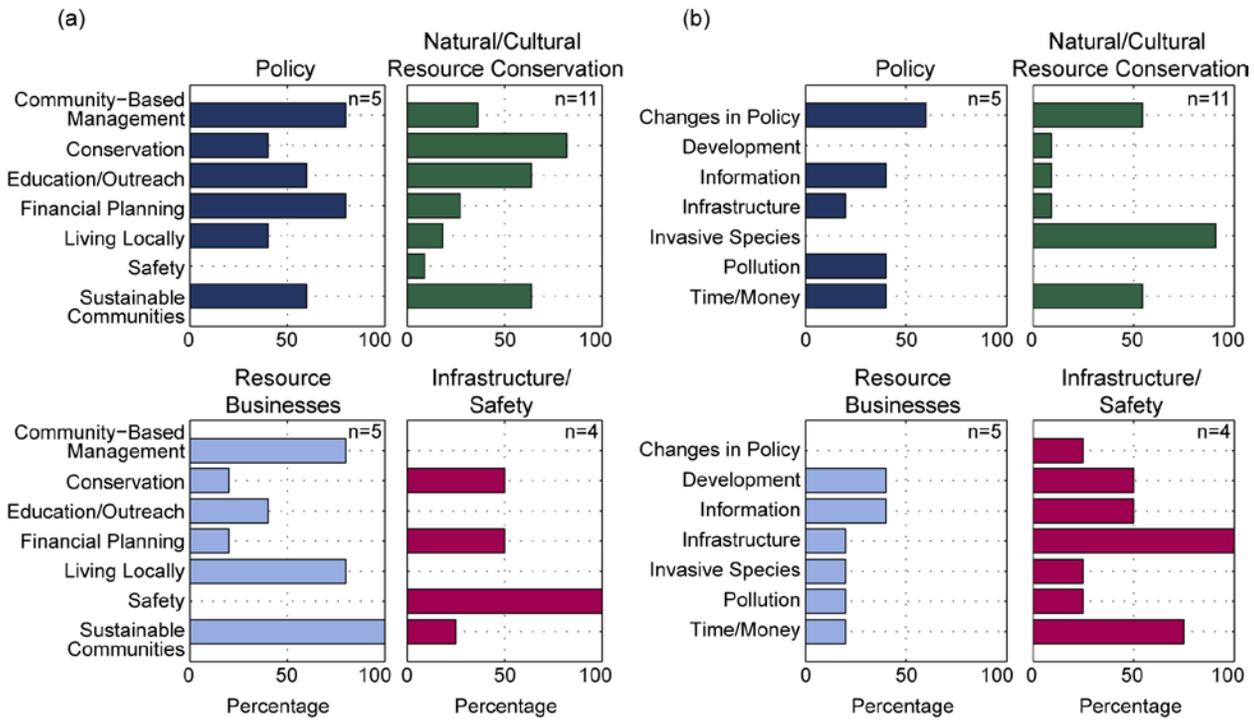


Fig. A1.1 Highest-ranked (a) goals and (b) challenges by interviewed manager types