Assessing the Policy Impact of the ANR Competitive Grants Program:

Findings and Recommendations

Clare Gupta, Public Policy Specialist

David Campbell, Community Studies Specialist

With assistance from Alex Cole-Weiss, Graduate Student Researcher

Department of Human Ecology
UC Davis
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Executive Summary

The purpose of this study is to examine the policy impacts of the ANR Competitive Grants program. Using data from interviews with ANR researchers and their policy partners, we explore the process of translating research to policy. Our key research question is: What strategies and practices make it more likely that ANR research projects will successfully influence public policy?

Key Findings

From our comparative case study analysis of eleven ANR-funded projects, we offer several key findings:

1) **Research sponsored by the ANR Competitive Grants Program is influencing various stages of the policy process**, including agenda setting, formulation, legitimation, implementation, and evaluation. As such, there is no "one size fits all" approach to engaging in research-to-policy translation, nor are the relevant policy outcomes limited to directly influencing legislation or regulations.
2) **Research design strategies** contributing to successful policy engagement include: targeting information gaps in the policy process, offering summary analysis that synthesizes existing data on a topic of interest, developing proof of concept projects, and mimicking the approach of studies that have demonstrated how to have strong policy impacts.
3) **Policy engagement strategies** contributing to policy impact include: building strong relationships and partnerships that augment research design, conduct, and/or end use; developing and/or leveraging strategic networks; and translating scientific language to ensure effective public communication.
4) **Policy contexts** in which more successful research-to-policy translation occurs include: projects which fit into a larger body of work over time; projects with a strong interdisciplinary team; and projects with an easily identifiable opportunity to meet an informational need.

Obstacles to Successful Research-to-Policy Translation

The case study analysis highlights a number of key obstacles which researchers encounter as they engage in policy processes, including:

- **Time and Timing:** Finding the time to engage in policy processes or to sync relatively slow research timelines with fast-shifting policy agendas and timelines in legislative bodies.
- **Bureaucratic inertia and turnover:** Patient efforts to build trust and relationships with bureaucratic policy makers can be undermined overnight by turnover of key personnel, a particular challenge since it can take a long time to change regulatory policies in risk-averse agencies.

- **Lack of resources to support outreach and dissemination of finding**s: grant funding and timelines typically end before a more robust dissemination/engagement strategy can be deployed.
- **Lack of familiarity with policy process:** Many researchers lack policy training and find the policy process unfamiliar if not forbidding.
- **Role Uncertainty:** Many researchers express uncertainty about where to position themselves on the continuum between pure science and engaged advocacy.

Opportunities for ANR to Better Support Policy Relevant Research

On the one hand, our findings suggest that existing ANR research is often more policy relevant than may initially meet the eye, given the possibilities for multiple points of entry at different stages of the policy process. On the other hand, there are a variety of ways ANR might further develop its capacity to produce, sustain, and evaluate policy relevant research. These include:

- Recognizing that there is more to policy relevance than direct influence on legislation by funding work that influences all stages of the policy process and uses a wide range of output forms and delivery methods to achieve policy impacts;
- Ensuring that merit and promotion process reward the time spent on building relationships and on network development;
- Developing a readily usable system for documenting policy work and impacts that can feed into ANR accountability processes, both internally and externally;
- Clarifying institutional expectations on the line between assertion of science and advocacy in the policy sphere.

INTRODUCTION

Land grant universities and the Cooperative Extension system strive to connect two key American ideals: science and democracy. When this succeeds, science plays its proper role in informing democratic debate; in turn, the people's values shape and guide the scientific enterprise. Achieving this ideal sometimes proves elusive. One overarching challenge is inherent in democratic policy making: decisions are not exclusively made with the best science in mind, but often reflect the contest between competing values or interests that provoke strong emotions (Peters, Alter & Shaffer 2010). Indeed, we want democratic politics to reflect value conflicts; the issue is how research might illuminate public issues and suggest workable solutions to problems.

As the new ANR Vice-President Humiston recently wrote,
> A second key challenge for ANR and all academic institutions is the level of scientific illiteracy among our population, coupled more recently with a growing lack of trust in science. This leads to dubious policy decisions, reduced investments in research and great damage to people, ecosystems and the economy. Better communication between scientists and the general public is desperately needed (2015 Vision Statement).

The goal of fostering research that reflects the people's values and informs public policy is at the heart of the historical and contemporary mission of the public university. Public skepticism of science and long-term disinvestment in higher education pose threats to this historical mission. In response, public institutions are under increased pressure to demonstrate the public value of their research. In part, this simply means doing a better job of articulating the value we are already creating. But it also requires new ways of working that are more intentional about linking research to public policy and more committed to reciprocal engagement with diverse populations and organizations.

As part of its effort to implement its "2025 Strategic Vision," the UC Division of Agriculture and Natural Resources launched a Competitive Grants Program in 2011. An explicit goal of the program was to create timely, policy relevant research that demonstrated ANR's public value. While some features of the grants program were new, the effort can also be seen as growing from existing ANR strengths and structures, including a long history of conducting policy relevant research and a campus-country structure that supports policy relationships at multiple scales: local, regional, statewide, and beyond.

Administrators, politicians, and researchers alike often imagine the research-to-policy translation process as direct and linear. However, policy scholars have shown this process to be much more complicated and nonlinear than is often realized (Totlandsal et al. 2006, Quevauviller 2007, Goldstein 2009, Smaigle and Ward 2013). In conducting research on the policy impacts of the UC ANR Competitive Grants Program, we sought to better understand the realities of the research-to-policy translation process, and to offer a more nuanced account that can help ANR increase opportunities to produce, sustain, and evaluate research that informs public policy.

Background

In 2014, ANR staff from the Office of Program Planning and Evaluation conducted an initial assessment of the UC ANR Competitive Grants Program. The assessment provided a broad

overview of the progress of the grants program towards reaching its goals to: a) support high-priority issues that are consistent with the ANR Strategic Vision; b) encourage collaboration among academics; c) strengthen the research-extension network; d) support short-term, high-impact projects; and e) contribute policy-relevant outcomes that address significant agricultural, economic, environmental and social issues in California. Promisingly, the results of the survey conducted through the assessment suggest a high level of success in reaching these goals. The program is investing in projects that support high priority issues, and projects are producing significant deliverables to address Strategic Initiative priority areas.

The survey results indicated that funded projects are contributing policy-relevant outcomes and fostering collaboration between academics and/or between research and extension. However, the assessment was limited in its ability to determine the precise mechanisms by which certain projects were better able than others to inform policy and decision-making. As a follow-up, the authors of this report conducted in-depth case studies of ANR-funded projects that had successfully demonstrated policy impacts. The goal was to better understand the nature of the policy impacts and the process academics and their policy collaborators undergo as they translate research into policy.

Methods

Sample selection. To select a sample of projects for in-depth analysis, we first reviewed all 52 projects funded through the ANR Competitive Grants Program from its initial three funding cycles (2011 through the 2013). We read the initial project proposals, yearly progress reports, and final reports (when they were available), with the goal of selecting approximately 10 projects to develop as case studies of relatively successful policy engagement.

While the term "policy" has multiple meanings, our focus is primarily on public policy as determined by governmental decision-making processes and secondarily on the policy or policies of an industry or organization that have major public impacts on ANR stakeholders. To select our case studies, we looked for projects that met one or more of the following criteria:

- Did the project influence the design of a policy? (e.g. Forest Service restoration management rules)
- Did the project influence whether a policy was adopted or not?
- Did the project influence how a policy was implemented? (e.g. Shift in funding focus of urban development policy towards youth wellbeing)
- Did the project reports indicate significant engagement with policy-oriented audiences?

Based on these criteria, we selected 11 projects to develop as case studies. The 11 cases include 8 complete or nearly complete projects that already have demonstrated policy impacts and another 3 ongoing projects with strong indications of delivering policy impacts. As indicated in Table 1, the sample projects reflect diversity across the five ANR strategic initiative areas, geographic location, and research team composition (i.e. a mix of projects led by Cooperative Extension advisors, specialists and Agricultural Experiment Station faculty).

Table 1. Characteristics of Case Study Projects

Project Title	SI category	Year(s) funded	Geographic Scope	Complete (Y/N)	PI Role	Policy/ Programmatic Focus
SELECTED PROJECTS						
Multi-Component, School-Based Approach to Supporting Regional Agriculture, Promoting Healthy Behaviors, and Reducing Childhood Obesity	HFC	2011-15	Sacramento and Stanislaus counties	N	CE Specialist	Obesity Prevention
Putting Youth on the Map: Youth Well-being and Vulnerability in California	HFC	2011-12	Sacramento region focus (and state-wide)	Y	AES Faculty, Prof. Res.	Youth development
Creek Carbon: Dynamics of Carbon and Nitrogen in Restored Mediterranean Riparian Zones	SNE	2011-12	Marin,Napa, Sonoma, Mendocino	Y	CE Advisor	Climate change
Ecosystem Services Interpretive Trails and Curriculum-Interpreting the Value of Working Landscapes to the Public and Policy Makers	SNE	2011-13	East Bay, Mid-Peninsula, Sonoma County	Y	CE Advisor	Grazing on public lands
Tools for a changing landscape: understanding disturbance and vegetation dynamics in northern California oak woodlands	SNE	2012-15	Humboldt area	N	CE Advisor, CE Specialist	Conservation of oak woodlands
Informing Sierra Nevada Forest Restoration: Re-measurement and analysis of 1911 forest inventory data from the central Sierra at large spatial scales	SNE	2012-14	Sierras	Y	AES Faculty	Forest restoration
Outreach and extension programs for co-management of food safety and ecosystem services in fresh produce	SFS	2011-13	Central Coast	Y	CE Advisor	Food Safety
UC ANR: A resource for Urban Agriculture	SFS	2012-14	State-wide (& 3 urban areas)	Y	CE Advisor, Acad.Coord.	Urban agriculture
Risk Assessment, Economic Analysis, and Extension Education for Asian Citrus Psyllid and Huanglongbing Disease Management in California	EIPD	2011-16	State-wide (SoCal, Central Valley)	N	CE Specialist	Pest management
Soil survey decision support tools for water resource sustainability and agricultural productivity	WATER	2012-17	Great Valley/state-wide	N	CE Specialist	Water resources
Groundwater Banking: An agricultural systems approach for water security in CA	WATER	2013-16	Great Valley and beyond	N	AES Faculty	Groundwater Management

Interviews. For each case study, we interviewed the project PI and/or co-PI or key collaborator, and also one or more of their key policy partners. We conducted 30 interviews between April and July 2015 with a minimum of 2 for each case. Most interviews were taped and transcribed; in a few cases the interviewer instead took detailed notes of the conversation. The set of interview questions addressed the background of the research and policy environment, policy impacts of the project, unique or particularly successful features of the project, challenges encountered in linking research to policy, and lessons learned from the project [See Appendix for full list of interview questions]. Transcribed interviews and related notes were uploaded into NVivo qualitative analysis software.

Analysis. As interviews were being completed, we began to identify and discuss emerging themes. Once the interviews were completed, a graduate student began a formal analysis process aided by the NVivo software. Starting with preliminary categories identified during the interview process, and incorporating new themes and categories that emerged during the coding of transcripts and interview notes, we began to build a more structured set of common themes. Coding categories developed inductively and iteratively, as the research team looked for key, distinct themes that occurred repeatedly across many different interviews. Each thematic code was then analyzed and summarized for substantive content and meaning.

Theoretical framework

As the key themes and findings took shape, we sought out basic theoretical models in the field of public policy with which to compare and then situate the emerging patterns. We chose to use a traditional framework for understanding the stages of the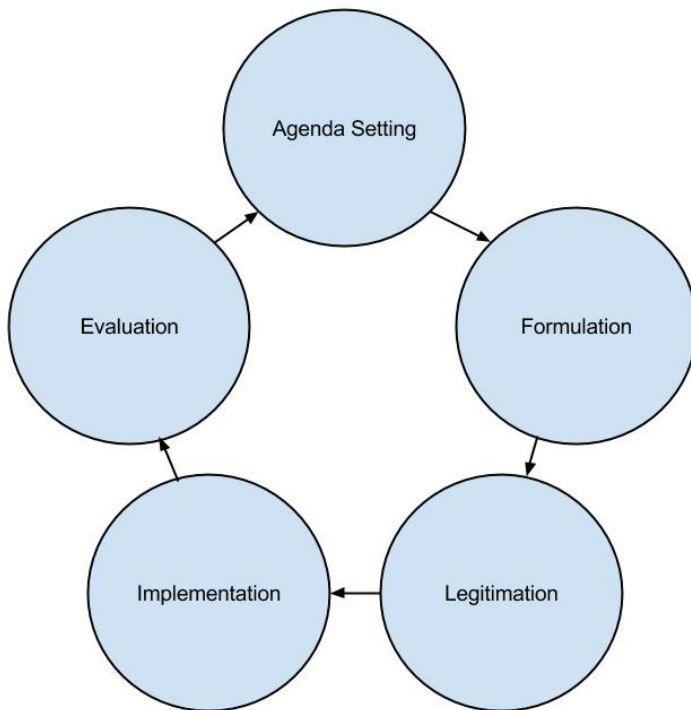 policy process (see Figure 1), which allowed for a broader and more encompassing description of the "policy work" being discussed in the interviews (Jones 1984). This model describes a *process* that plays out over time in more or less predictable stages. As with any simplified model, the caveat is that the actual progression of policy through the stages is not always as straightforward as the diagram might suggest. Policy agendas, for example, are continually being negotiated or reframed throughout the various stages. Evaluation may or may not inform subsequent policy agendas, or may not happen at all for certain policies. Sometimes early implementation issues cause policies to be withdrawn or recast mid-stream,

Figure 1. Policy process stages

with or without formal vetting. Still, the framework is useful, in particular because *it identifies multiple points at which research might inform or influence the policy process* (see Table 2)*.*

Table 2. **Key Tasks at each Stage of the Policy Process**

Policy Stage	Typical Process Tasks
Agenda Setting	● Create public awareness/get issue on agenda ● Mobilize support/build coalitions ● Provide relevant information to decision-makers ● Draft bills or regulations
Formulation	● Craft legislative language ● Develop proposed orders, laws, rules or regulations ● Debate and negotiation over alternatives
Legitimation	● Formal decision-making by proper authorities ● Create goals and identify means for achieving them
Implementation	● Resource allocation ● Policy actions ● Tangible outputs ● Intended or unintended impacts
Evaluation	● Impact assessment ● Process evaluation ● Recommendations

Conceptualizing research-to-policy translation

Quite often, the way researchers conceptualize research-to-policy translation puts primary emphasis on influencing the formulation and legitimation stages of the policy process. According to this oversimplified narrative, expert researchers do high quality research and publish findings and then skillful and informed policymakers take and utilize these findings to develop a policy (order, law, rule, regulation, etc.) that reflects the empirical evidence. Both the policy literature and our own findings from this research suggest that this idealized narrative is more aspirational than accurate. In rare cases one might draw a definitive line from research to policy formulation. More typically, researchers find themselves engaging in ongoing policy processes with strong internal momentum, in which research findings are not singularly driving policy. Indeed, these processes can be dominated by powerful interests who have a stake in the status quo, and are not necessarily interested in research unless it serves their pre-existing agendas.

In confronting this reality, what our case studies suggest is that researchers who create policy impacts make use of multiple points of entry into the process at multiple jurisdictional scales. Across our 11 cases, we find examples that focus on each of the five stages of the policy process. Our data shows that UC ANR researchers are in fact engaged in impactful policy work in diverse areas of policy making, and through multiple points of entry. A key lesson from our project is that accurate evaluation of policy impacts requires a more holistic look at the policy process, and a systems thinking reframing of research-to-policy translation.

RESULTS

Overview

The qualitative analysis approach we used yielded findings in three interrelated areas. First, the sampled researchers conceive of policy engagement and impact in diverse ways, which correspond to different stages of the policy process. Second, and related, there is no one right way to do policy-relevant research and different strategies or contexts necessitate different types of policy-relevant outputs. Third, despite the contextual variation, the analysis points to a few more broadly relevant principles that are associated with more successful policy impacts. Drawing on the data, we describe these principles as they apply to three common elements of policy research practice: 1) research design strategies; 2) policy engagement strategies; and 3) pre-existing enabling conditions.

I. Expanded definition of policy engagement and impact

One question we asked all interviewees was: "What do you think of when you think of a policy impact—what does the phrase mean to you?" Table 3 below summarizes the range of respondents' policy impact definitions, organized by how they correspond to stages in the policy process (almost all responses fell into at least one of the policy stage categories). Notably, nearly as many of the interviewees described their primary impact as on the agenda setting stage as the formulation stage. Only one of the responses spoke to the potential role of doing evaluations that influence policy, although that is one obvious role university research can play.

Table 3. Interviewee Definitions of Policy Impact

Policy Stage	*Policy Impact Definition*
Agenda Setting	• Shift attitudes, frameworks and ways of thinking that undergird policy systems and institutional/organizational practices • Articulate needs, get them on the table • Demonstrate through research results the rationale for policy change • Influence the culture of an organization (mission, values, vision, world view)
Formulation	• Help shape legislative or regulatory language • Share knowledge that contributes to and/or influences rules and regulations • Influence changing a state or federal law, agency or regulatory framework
Legitimation	• Play role in getting a policy/regulation passed or changed
Implementation	• Influence implementation rules and/or maintenance of a policy
Evaluation	• Develop monitoring tool to evaluate policy impacts

Our comparative analysis of responses shows that many researchers see their work as focusing on a single stage of policymaking, but the projects taken together suggest multiple 'points of entry,' to policy, across the policy stages. As one PI noted,

Policy work doesn't only involve passing [formal] laws. Policy work also is… the community organizing and the base building and the capacity building and the political education that can then help people engage in [the] policy realm. So I think there's a lot of things that are policy relevant that are outside of or lead into the formal policy world.

Even in a scenario in which policymakers are looking for robust evidence as they develop and/or consider a policy as it is being formulated, there is rarely a linear cause-and-effect result given larger political dynamics, cultural values and attitudes, and scientific uncertainty. As one interviewee noted,

> I think of a policy impact as actually having some input on legislation created in Washington D.C....It's not just the testifying. I think it's actually behind the scenes where you have people asking you questions about what things you might provide. My experience with the testimonies is the decision has already been made and people are there just for some sort of public vent venue, you know? I don't see that as a great way for input...the political process is a tough one, you know? It's not all about science as you know. I don't think it's more than 25%.

This sentiment was reiterated by a number of interviewees, who recognized 1) that science is only one of many influences on policy development and 2) that there are various ways to influence the policy process beyond established formal channels.

II. Linking project outputs with policy outcomes

In the context of the UC ANR grants program, project *outputs* are defined as concrete deliverables, such as policy briefs, datasets, journal articles, mapping tools, etc. Policy *outcomes* typically are much less tangible and quantifiable, and thus harder to discern or measure. Part of the challenge in evaluating a project for a policy impact is to understand the connection between project outputs and policy outcomes. When a researcher defines a policy impact as a "change in the thinking of how to do things," how might that be assessed and by whom? Questions like these abound in the black box of research-to-policy translation. Further complicating the picture is that the output expectations of academic institutions, such as journal articles, often do not match the needs of end users in policy arenas.

In an era of rapidly changing communication and data technology, our interviews showed that there is no single most effective method for developing policy-influencing project outputs. Instead, there is a spectrum of approaches characterized by new, exciting, and innovative techniques on one end, and historical, tried-and-true methods and formats on the other. For example, the Urban Agriculture project wrote a successful policy brief (a more traditional policy tool), whereas the Soil Survey Decision Support project developed a mobile app to serve as a decision-making support tool. The analysis suggests that a wide range of output forms and delivery methods can be used to achieve a policy impact. Recognition of this diversity can inform ANR policy work, including the content of policy training, specification of grant deliverables, evaluation of project policy impacts, etc.

The project outputs and policy outcome examples listed in the table below demonstrate the range of policy outcomes the UC ANR Competitive Grants Program has generated to date. Policy outcomes are understood generally as the mobilization of project outputs into tangible policy-related actions, usually undertaken by end users either with or without the collaboration of the project team. While it may be difficult to track these actions, which often extend beyond the scope of the grant timeline, our cases demonstrate the need to think beyond a list of project outputs if we are to properly assess policy impact.

Table 4. Project Outputs and Policy Outcomes

Project	Project Output	Delivery Method	Policy Outcome Examples	Policy Process Stage(s)
Urban Agriculture	UA web portal UA Policy brief Implementation guide for AB 551 (Urban Agriculture Incentive Zones)	Urban agriculture advocates deliver information from Urban Ag Portal to city and county level policymakers	Governmental support for local urban ag ordinances; adoption of AB 551	Agenda Setting Legitimation Implementation
Putting Youth on the Map	Putting Youth on the Map mapping tool	East Oakland Building Healthy Communities organizers use mapping tool for youth mobilization around Prop 47	Informs planning efforts around crime prevention allocation from Prop 47 Implementation (converts non-violent offenses to misdemeanors)	Agenda Setting Implementation
Co-management of food safety and ecosystem services in fresh produce	Info sheets on co-management Online training modules, videos on co-management for food safety and conservation	Farmers use info sheets in conversations with food safety auditors to explain and legitimate on-farm co-management strategy	Co-management language incorporated into the Food Safety Modernization Act (FSMA)	Implementation, Formulation, Legitimation
Shaping Healthy Choices	Integrated school wellness program	Formal presentations of results (task forces, conferences); Informal sharing of results through relationships within Ed policy networks	School wellness advisory councils; Dept of Public Health roll-out of Shaping Healthy Choices program in other school districts (pending)	Implementation, Evaluation
Interpreting the Value of Working Landscapes	Info sheets on benefits of rangeland grazing in parks	Partner with park staff on signage to educate public on value of cattle grazing in parks	Policy of grazing on public lands is maintained	Agenda setting, Implementation
Disturbance and vegetation dynamics in northern California oak woodlands	Dataset on disturbance and vegetation dynamics in northern California oak woodlands	Forest Service Board uses datatset to campaign for rule amendment to address conifer encroachment	Forest Service Board made aware of need to change policy; data supports Congressional change in FS rules (pending)	Agenda Setting Formulation

Creek Carbon Restoration	Dataset on carbon sequestration dynamics of creek restoration and conservation	Partnerships with local government actors to use data to inform local climate plans	Conservation work put into county climate plans; path to develop state-level protocol for GHG mitigation (AB 32)	Agenda Setting Formulation Implementation
Informing Sierra Nevada Forest Restoration	Dataset on historical forest conditions	Partnerships with Forest Service; engagement with NGOs	*Ongoing project* (likely to impact development and implementation of Forest Service restoration policy)	Formulation Implementation
Asian Citrus Psyllid	Geospatial map of disease prevalence; economic analysis of disease costs	Engagement with Citrus Board, CDFA and local task forces	*Ongoing project* (likely to impact state prioritization of funding for disease control)	Agenda Setting
Soil survey decision support tools	SoilWeb app (decision-support tool, provides info about soil qualities)	Engagement with NRCS (and possibly with growers, state water boards and other state agencies)	*Ongoing project* (likely to impact state zoning and conservation program implementation)	Implementation
Groundwater Banking	*Ongoing project* (provide evidence of groundwater banking effectiveness)	*Ongoing project* (TBD)	*Ongoing project* (likely to impact implementation of Groundwater Management Act)	Implementation

Table 4 illustrates the *types* of policy impacts associated with our sample of cases; in the following section we highlight the *mechanisms* (i.e. principles, strategies and practices) through which ANR researchers were able to achieve these successes.

III. Principles for successful research-to-policy translation

A. Research design strategies

Effective research design strategies are one important way to facilitate policy engagement and impact. Given the short grant timelines, the sample projects tended to focus on synthesis of existing data and/or implementation of existing findings rather than collection of primary data. Projects modeled after previous examples of research that had successfully impacted policy, and "proof of concept" projects also were pursued. Four of the most effective strategies are described below.

1. Targeting information gaps in the policy process

Each of our sample projects designed its research question around a gap or disconnect in the policy process, in some cases addressing multiple gaps simultaneously. For example, the Soil Survey Decision Support project developed the SoilWeb app tool to bring together information about soils. The tool was able to influence agenda setting in environmental resource management arenas and to support ground level implementation. In response to recently passed California groundwater legislation mandates, counties can use the tool to assess land use impacts on

groundwater resources and to create regional management plans. The app can also support implementation of the Williamson Act, which provides tax breaks to landowners who keep farmland in production but on soils of certain productivity class ratings. As in the soil app example, the policy target identified in many projects was a gap in information impacting implementation, rather than on creating a new policy.

Successful projects were characterized by an awareness of the context within which the work took place, making it possible to better identify how information could impact decision-making or at what stage of the policy process new information was most needed. As one interviewee put it,

> I would really encourage attention to the ecological environment in which policy gets developed, implemented, and assessed. That's a really complex landscape and it's not just about the state legislature or a particular agency. But it's about a variety of institutions and networks operating together in particular social and political environments. So I've been [trying to get] really savvy about that, and how [the project] is going to interface with that overall environment is really important.

The PI on Oak Woodlands Disturbance project contrasted the limitations of basic research—in which researchers develop a research project, create knowledge, and then try to figure out the real-world problem it solves—with her applied approach. She identified the problem first and then did the research to address the knowledge gap. A slightly different take on the same idea is offered by a policy partner on the Urban Agriculture project, who explained that civic groups don't read literature reviews and then decide what the policy should be; they decide the kind of policy they want and then go and find out what literature supports it.

2. Synthesis and communication of existing data

Having targeted certain information gaps, the sample projects focused on bringing together the best existing knowledge in the field, in order to provide policy makers a more complete picture. For example, the co-management of food safety and ecosystem services project did not conduct primary research, but instead drew from existing literature on co-management to create online training modules targeted at educating farm auditors. As one PI explained,

> I think there continues to be this need to go back [and] look at the research that's being done that is applicable to the field, and to be able to continue to develop strategies for how to actually balance food safety and sustainability in the field. That's the biggest research need. The research is happening. The process of developing implementation strategies is not there. And as a land grant institution I think we should be doing that.

The Citrus Disease Management project and the Urban Agriculture project also sought to provide decision-making support tools based on the synthesis of existing data, drawing on the historical role of extension to communicate research in easily accessible ways. As the PI described,

From outset the goal was to communicate information and have influence on messaging [about what story is being told to the public and growers] and to find better ways to communicate...scientists in general are not trained to think in terms of policy and messaging unless they have an extension appointment—and those of us with extension appointments have not been allowed to get grants that deal primarily with extension. This ANR grant program [was a] unique opportunity to do something more extension related and less about [primary] research.

As another interviewee noted in regards to the community needs assessment done for the Urban Agriculture project,

[People] didn't know where to go find about the policies, or what the details were, or how they could access it…[the information is] not transparent, it's not easy to find, it's not easy to understand, it's not…If there are rules and regulations…how do you find out about [them]?

The researchers responded by providing a synthesis of these rules and regulations, as well as literature on urban agriculture more broadly.

In a number of cases, the goal was to equip end-users with existing data in a digestible format that they could then mobilize for their own policy agendas. As a Putting Youth on the Map (PYOM) project team member explained,

So what we were really interested in doing was providing tools to people who are well positioned to be developing and driving policy agendas [so they could use the data]. And our work was really more around [creating] this framing and scaffolding to support those kinds of discussions and activities.

For this project, providing a robust, publicly available, and interactive data platform for grassroots agenda setting, and working with select partners to put the platform to use, proved to be more effective in influencing policy than simply making maps of under-served youth communities.

The prevalence of this "knowledge synthesis" strategy speaks to the ongoing value of the knowledge broker role in extension, especially the work of advisors and specialists in establishing and maintaining reciprocal relationships between the university and diverse publics and policy spheres. In some cases, extension provides scientific evidence in the face of strong yet misinformed political opposition. An example from our sample of cases is the Working Landscapes project, which developed park signage articulating the value of working landscapes as an ecosystem service, in order alleviate public concerns about cattle grazing in parks.

3. Proof of concept

A few projects set out to understand the empirical basis for proposed natural resource management policy or to provide an experimental basis for developing future policy implementation protocols. These research efforts were described by interviewees as "proof of

concept" projects, and researchers worked with field-based partners to set up experiments in real world settings. For example, the Groundwater Banking project worked with alfalfa farmers to develop field trials where farmers themselves could see the impact of experimental flooding. These trials provide evidence of the potential for groundwater banking as an implementation mechanism for the recently passed Groundwater Sustainability Act. In another example, the Creek Carbon project evaluated the carbon sequestration benefits of existing on-farm stream restoration practices in order to show how those practices could fit into greenhouse gas (GHG) mitigation efforts mandated under AB 32, California's GHG legislation. Already, the data from this project has informed county climate action plans in Marin.

Proof of concept projects are not limited to the natural resource realm. The Shaping Healthy Choices project took a "vague" school wellness policy mandated by the Department of Education (which existed on paper but not in practice) and developed a multi-component school wellness program that improved schoolchildren's diet and ultimately, their body mass index (BMI) levels, a key measure of obesity. The success of their multi-component approach to implementing school wellness policy in a handful of school districts is now leading to steps to implement the program more widely across California.

4. Mimicking designs from previously successful research-to-policy translation

Mimicking research designs from previously successful policy research is another way to increase the likelihood of having a policy impact. The Oak Woodlands Disturbance project modeled their research approach on a successful research-to-policy translation effort in the realm of aspen tree management. The co-PI on this project explained that making changes to the Forest Practices Rules governed by the Board of Forestry is a contentious process that is generally based on professional judgment and risk aversion, rather than sound science. To effectively use scientific data to amend the Forest Practice rules around oak woodlands conservation, he and his team "patterned our approach after something [the Aspen Rule] that had already worked previously." By understanding how key end users of research are likely to make policy decisions, the project was able to focus its policy engagement efforts more effectively.

B. Policy engagement strategies

Even the best-designed research will not impact policy if it is not accompanied by effective policy engagement strategies. Three strategies were common among our sample of cases: 1) building relationships with policy partners; 2) taking advantage of network connections to leverage research; and 3) translating scientific findings to communicate in public settings.

1. Relationships

In all of the projects selected, strong relationship and partnership development played an important role in research-to-policy translation. Strong relationships can create research opportunities, improve research design, support the data gathering process, and make it more likely that research will be used. As we have seen, two-way exchanges helped the Urban Agriculture project pinpoint the stakeholder needs for better understanding of city-level codes and ordinances. But stakeholders were also able to take the literature review provided by the

project team and use it to advocate for urban ag-friendly policies at the State Legislature. Similarly, the Shaping Healthy Choices project spent a great deal of time and energy to develop school wellness committees and integrate them into their research process, resulting in greater buy-in to the program's implementation. This kind of strategic relationship building ultimately led to widespread recognition of the program's success, and interest by USDA and the California Department of Education in implementing it more broadly.

A key element of successful relationship building was the involvement of multiple stakeholders early on in the research process/timeline. The Urban Agriculture project did this most explicitly in the form of a community needs assessment, which then guided the direction of their research. This process requires a certain degree of "letting go," and a willingness to approach partners with an open mind about what they will or will not understand and/or deem important. It also requires a significant amount of time. As described by the PI of the Groundwater Banking project:

> The first six months before the grant even started we already started working with growers trying to reach out to them and trying to engage them and make them interested in the project. And that phase of building trust with a couple people is really essential and it needs time. You can't force that process.

The following quotes speak to the importance of relationships in our sample projects:

> It's probably difficult to put a number behind, but that connection with individuals on a particular forest, and even in the region too, that is huge. Like some of these [research papers] don't just have enough legs to move on their own. It's [rare that] a new paper comes out and it's like, "Oh, this is going to change the way we do everything." It's really about having a good relationship with people and then using that to bring forward the new information.

> Relationships with key potential end users are really important. And not just the relationships, but our experience having worked with them before, so having some sense of how to go about working with them, and how that's going to feel genuinely collaborative and mutually respectful. Also, having some sense of what their needs [are] likely to be, but then also those relationships being able to build on our insights, to actually bring in their insights [to the research]. I think that was very important.

> The fact that this [project] came from and continues to support a local partnership has been helpful. It's…keeping us focused on being applied and not getting lost in what still could be very useful research, but maybe not as directly relevant to those [in] the field, on the ground, doing things...Because we, as a partnership, could divide tasks and prioritize something in one year, like research, and then shift to some policy engagement the next year, we were able to move resources and capitalize on each other's time and expertise.

Strong relationships expand the reach of information and support access to important decision-makers and end users. For example, one of the PIs on the Groundwater Banking project explained that their link to the California Institute of Water Resources had opened up a wider network of potential users of their research:

The Water Program Director has been very supportive and has even been distributing information about our project on a regular basis. Once in a while, he sends a person over and says, "Oh, can you talk to this person? They are visiting. They are interested in this project."

Respondents also noted that strong connections to end users keeps them relevant to real world needs/challenges, and can potentially make the introduction of new or different ideas easier. For example, school teachers are often resistant to additional curriculum that adds to their already overburdened schedules, but by working closely with teachers and principals from the beginning, the Shaping Healthy Choices project was able to obtain buy-in from teachers and administrators which then facilitated the effective roll-out of the program in (and out of) the classroom.

2. Network development and leveraging

Individual relationships are important, but another level of influence can result when researchers use their projects to build or connect with established networks, which last well beyond the lifespan of the project itself. Tapping into networks occurred at various stages of the projects, from putting together the project team, to seeking support in dissemination or implementation, to leveraging financial resources from non-ANR sources. The sample projects were connected to a wide variety of networks, including nonprofit groups focused on disadvantaged youth, resource management staff focused on fire, land use committees, organizations representing public school administrators, and many others.

Our interviewees took a range of approaches to developing and leveraging their networks. In some cases, they capitalized upon the existing UCCE network structures, such as tapping county advisor connections to identify farmer participants in a proof of concept study of groundwater banking. In other cases, researchers used intermediary groups (such as nonprofits or government agencies) to expand the influence of their research. For example, one of our interviewees has worked with NGOs over his lengthy career to influence Forest Service policy. As he explained,

I've always thought of them [Sierra Forest Legacy, large environmental NGO] as very engaged. They read our papers—they read them even more carefully sometimes than we do. So they're very, very engaged. They talk to us a lot. I'm happy to talk with them. They actually, I know, have real policy implications. They know Feinstein well. I've always thought that was another important thing, you know, that policy development is working with these engaged publics.

Across the board, ANR researchers engaged in network leveraging for access to key end users. While ANR researchers who have been in their positions longer may have more established networks to draw from, early career ANR researchers are still able to take advantage of their role as a conduit between the university and the California public. In some cases, these connections may be built before their utility for informing the policy process is even clear; and in others, the researcher may have a policy target in mind as she or he strategically brings together the relevant stakeholders.

Given the importance of networks, the choice of which networks with which to engage becomes something which researchers need to approach intentionally and carefully. Researchers who become too identified with particular networks—particularly those representing narrow or traditionally well-connected interests—risk losing broader public credibility.

3. Translating scientific language to communicate in public settings

Not surprisingly, finding ways to effectively communicate findings is key to successful research-to-policy translation. Policymakers and the general public don't relate well to disciplinary jargon, and often interpret key terms differently. As such, careful attention to language is critical to policy work. The cases provided multiple examples of how the translation of research into accessible terms and formats led to effective policy engagement.

One effective practice common to many of our sample projects was to re-write project documents after getting feedback from potential end users, UC ANR communications support staff, and others who could comment on the appropriateness and effectiveness of the language. This process takes a great deal of time and energy, but pays off in terms of creating a relevant product that will be used. The collaborative approach to language issues was very clear in the Working Landscapes project. As the co-PI on this project explained,

> So first with the signage [about the value of cattle grazing on parklands], we worked with the park personnel in a way of learning about 'park-ese.' It's interpretive language…using up to just a hundred characters or a hundred words to get the message across… So how do you get scientific messages across in a hundred words or less?

Similarly, a co-PI on the Creek Carbon project explained the iterative process of communicating his research findings, which relied heavily on partnerships with end-users:

> I'll continue to hone and practice, and I get feedback, so going back to all those partners and practitioners that I talked about sharing it [the data and results] with, making sure that they're getting it in a way that they can digest and that they can use.

Translating research into policy relevant information and/or for decision-making also requires going beyond the common conclusion of 'this merits further research' and instead necessitates that researchers provide the key relevant implications of their research. While this extra step can make researchers uncomfortable (i.e. moving from "presenting the facts" to a more interpretive stance), many interviewees agreed that in order to influence the policy process, this component of research translation was essential, even if it took them outside their comfort zone. As a policy partner in the Forest Service explained,

> When they [the Forest Restoration project team] did the research, they could have just said, 'Here's the data, here's what it shows.' But they took it one step further, they said 'here are the impacts, the implications'; they brought it back to what it means to us as [Forest Service] managers. Doing this draws a distinction between them and other researchers.

Ensuring that clear scientific language is incorporated into the crafting of formal policy is another, slightly more traditional, way that ANR research can engage in the policy arena. This in turn can have a huge impact on familiarizing both policymakers and the general public with new, cutting-edge scientific approaches and paradigms. An example is the co-management of food safety and ecosystem services project, where co-management language was incorporated into the Food Safety Modernization Act.

C. Pre-existing enabling conditions for policy impact

In addition to intentional research design and policy engagement strategies, there were a number of contextual variables that fostered a project's ability to translate research into policy. Highlighting these pre-existing conditions serves as a reminder that projects do not unfold in a vacuum, but are part of a larger ecosystem that can either facilitate or hinder a project's research-to-policy intentions. Three relevant contextual considerations seem most important in our sample of cases: 1) how the research fits into a larger body of work; 2) the presence of a strong, interdisciplinary team; and 3) a timely policy impact opportunity that matches with existing expertise or knowledge.

1. Project fits into larger body of work

Many of these successful projects derived from issues or programs that researchers had been engaged in for a long time, in some cases for the length of their careers. Being able to build on a larger body of work relates to a number of already mentioned themes, including relationships, networks, and timing. For example, the policy partner for the Citrus Disease Management Project (a grower liaison), explained that the PI for the project was involved in a number of other related projects, paving the way for this project's findings to be integrated into ongoing pest management policies. Policy change at any level takes time and requires good information as well as good working relationships. Researchers who were plugged into pre-existing networks were better positioned to achieve policy impacts, which often require follow-up activities that extend well beyond the grant timeline. The Forest Restoration project, the Oak Woodlands Disturbance project, and the Putting Youth on the Map project all engaged with policy-related end users and partners after their grant officially ended, enabling them to achieve or sustain policy impacts.

When projects fit into a larger body of work, there are more opportunities to be nimble in weathering political changes and obstacles. These obstacles range from personnel turnover (as in the case of the Working Landscapes project) to stalemates at different levels of government policy. For example, the PI from the Forest Restoration project articulated that there is a massive need for forest policy reformulation at the national level, but because Congress is at an impasse, little legislation can be passed. Instead, he is using his established position as a reputed forester in California to engage at the state level, while remaining optimistic that space may eventually open up to push for change at the federal level. Similarly, a co-PI on the Creek Carbon project seeks to use his findings on carbon sequestration related to on-farm creek restoration activities to influence the protocols approved under AB32 (California's GHG reduction legislation) and more specifically, to incorporate conservation-oriented agricultural practices into an approved AB 32 protocol. However, because there are major bottlenecks in this state-level process, he has decided

not to "pin his hopes" on the state policy process. Instead, his project focuses on county-level policy-making where there may be more traction and where he is more relationally embedded.

2. Interdisciplinary team and strong team dynamics

While individual researchers are certainly capable of doing effective policy work, the majority of our selected projects were highly multi- or interdisciplinary in nature. As one cooperative extension specialist reflected,

> I think having a multidisciplinary team was very helpful in drawing out some of the policy conclusions. For example...first our policy brief was all these paragraphs on different topics written by experts. Even though that didn't end up being workable for a policy brief, having those kinds of perspectives in the mix was really helpful. It was challenging to synthesize all that, but I think it made coming up with policy ideas a lot easier.

Working within an interdisciplinary context requires strong team leadership and project management skills; together these qualities supported teams in drawing from a broad pool of qualified experts, sharing resources and responsibilities, and staying focused on achieving grant deliverables. Given the time and resource constraints of many projects, the ability to balance research activities and communication amongst various stakeholders in a timely manner was an important condition for successful policy engagement. As articulated by a co-PI on the Oak Woodlands Disturbance project,

> [My co-PI] and her key staff person on this are terrific at keeping us all engaged and sort of keeping a unified focus about what the goal of the project is. Policy relevance has been at the forefront right from the start. She and I have regularly kept the team involved in what we're getting from the presentations to the Board of Forestry and the forest practice committee, so they have a sense of what the policy relevance is right from the [beginning]. In these regular calls we always have some kind of briefing on what's happening on the policy front.

While these qualities are reflective of successful research teams in general, not just policy relevant ones, they serve as a useful reminder of key dynamics that ensure that the policy outreach component of a project is not forgotten about or overlooked.

3. A timely policy impact opportunity

Most of the selected projects were situated within a context where there were easily identifiable policy impact opportunities. As discussed earlier, one form this takes is filling important information gaps. Another form this takes is gathering information that legitimizes on-the-ground practices in the face of unclear or conflicting policy. The Urban Agriculture project synthesized the literature on the benefits of urban agriculture, which was information needed by urban farmers to legitimate and make legible their on-the-ground practices to policymakers. As stated by one of the team co-PIs:

The truth of the matter is that we're catching up to the community members. I feel that policy and even the researchers are a step behind the community members. And so I think a lot of the kind of landslide support for this [urban ag friendly] policy is because of recognition that the community members have been practicing this and working through these hurdles for decades. It's only really within more recent years that policymakers and academics are perhaps tackling them.

Still another timely opportunity is the ability to document evidence-based best practices that can shape implementation guidelines. The Shaping Healthy Choices project took this approach to inform how school wellness policies could be effectively implemented. This approach is particularly opportune in a context where policy rules and regulations are in flux. For example, the co-management of food safety and ecosystem services project was able to identify on-farm management best practices, which were used to inform pending legislation around the Food Safety Modernization Act.

Sometimes the alignment between a policy need and the evidence a project could provide was the result of fortuitous timing—the project unfolded in the right place at the right time. However, the more intentional researchers can be, the more likely it is the research will be relevant and useful. Indeed, some of the case projects were characterized by researchers who had the ability to "see ahead" to potential challenges or needs in their fields. Being anticipatory is important in the policy realm, increasing the likelihood of providing information that is both valuable *and* timely. For example, researchers who can identify a "hot topic" in its early stages—such as in the case of the Citrus Disease Management project—can position themselves for high policy impact.

IV. Obstacles to Successful Research-to-Policy Translation

We asked our interviewees to identify challenges they faced in their projects. Many obstacles they articulated are typical of any research process. Our focus here will be on challenges that are more specific to research-to-policy translation efforts, including: 1) time and timing; 2) bureaucratic inertia and turnover; 3) lack of resources to support outreach and dissemination of findings; 4) lack of knowledge about policy-making and translation; and 5) role uncertainty in walking the line between asserting science and advocacy.

1. Time & Timing

Diverse challenges related to time were recurrent throughout the interviews. The multiple demands placed on UC ANR researchers and growing workloads were identified as obstacles to having adequate time to develop relationships, do policy networking, and to keep up on developments in their field. This challenge is exacerbated by the perception that the merit-based review system incentivizes publications, but does not provide equivalent rewards for other important components of policy work, such as relationship building, synthesis of existing research, etc.

The scale at which important policy is made often exacerbates the time crunch. Researchers find it difficult to go to Sacramento, where state-level policy decisions are made, and even the state-level projects that are conducted are not always able to address the type of information people

need at the local level. For example, the Urban Agriculture project team members noted that their state-wide focus precluded their ability to provide urban farmers with information on policies and codes specific to their individual cities.

Consensus building is difficult and often slow work, particularly in highly polarized policy arenas. Not surprisingly, researchers noted that the state legislature and U.S. Congress are difficult to work with because of current political polarization, especially on issues of climate change, natural resource management, and economics. More generally, PIs cited resistance to new ideas as a recurring obstacle. This included the difficulty of getting big bureaucracies to change and the challenge of working with private sector interests in areas characterized by a fear of litigation (e.g. food safety or other risk reduction environments).

Some interviewees noted that turnaround times on getting feedback on their outreach materials from ANR staff or others often make it difficult to produce quality products on time. This is especially true for projects targeting gaps in the implementation stage of the policy process. Time is a crucial component for community buy-in, building support, and training. In general, researchers noted that the time requirements of research (grant writing, data gathering, trial results, analysis) can make it difficult to retain the interest of policy partners, the public, and other end users. Research timelines and policy process timelines are thus rarely in sync. Finally, some researchers' comments about the pressure to put out policy recommendations before peer-review highlights a recurring tension between academic norms of scientific rigor and policy practitioners need for timely information that is "good enough" to help shape policy and practice.

2. *Bureaucracy & Personnel Turnover*

Institutions and/or organizations are often slow to make formal policy changes and/or changes in the implementation of policy; this lack of flexibility can make applying research difficult. Several researchers mentioned that they felt the current bureaucratic structures they interact with are not flexible or acting quickly enough to address climate change issues. Also, researchers confronted bureaucratic challenges in getting information and data from key agencies; some mentioned the risk-averse nature of regulatory agencies. In some projects, researchers experienced an institutional disconnect between policy approval and implementation, such as policies not being implemented at lower levels because key staff positions were not filled or simply the press of competing implementation priorities. Personnel turnover within partner institutions also proved a challenge to maintaining relationships, lines of communication, and agreements between researchers and partners.

3. *Lack of resources to support outreach and dissemination of findings*

A number of researchers said that funding timelines in the UC ANR competitive grant structure do not usually allow enough time or money to complete the policy engagement elements of projects to their satisfaction. As with many other grant programs, PIs in our sample of cases expressed frustration on what they perceive as inadequate resources to support the implementation, outreach, and/or dissemination phase of projects. One coping strategy is to depend on volunteers in their networks to support and carry out certain follow up activities. For example, projects that developed a tool that required training or capacity-building to use found

ways to make that happen outside of the grant resources. Being able to fund implementation, training, and capacity building is especially important when the work is aimed at building new stakeholder capacities rather than simply fitting into an already well-established structure or policy agenda. Adding to the challenge is the reality that some follow-up and outreach strategies cannot be identified in advance, but evolve during the work itself. Researchers also mentioned that it can be difficult to get useful feedback from dissemination/outreach events and to track impact over time.

4. Lack of knowledge about policy-making and translation

Many PIs indicated that their lack of knowledge about the policy realm is a challenge. Researchers expressed their view that scientists are not necessarily trained in policy writing and messaging, and since policy is not their area of expertise, policy products get neglected or postponed. Moreover, researchers are not always sure how to package their policy work for ANR, such as in the policy brief requirement. Researchers identified developing policy-oriented language and communication strategies—a key criterion for successful policy engagement as described above—as particularly difficult. For example, one of the Urban Agriculture project team members reflected:

> I was already immersed with the policy world. Even so, I found writing a policy brief to be absolute torture….it just didn't come naturally to us [the project team]. As academic people, I think we tend to just write in a long, lengthy, convoluted style, and people kept reviewing it and going, "Uh, this is like too long. It's too hard to understand. Cut to chase." ...It took us months. We kept bouncing drafts back and forth and someone would look at it and they'd go, "no." ...it was hard to find the time for it and it was just hard to crunch it down into something usable, but policy friendly.

5. Role uncertainty in walking the line between asserting science and advocacy

Our respondents struggled with gaining clarity about where the line between engagement and advocacy should be drawn. Even with the right data and the right networks, using research to influence policy can be difficult, because the policy process is based on negotiations of power, resources, and connections as much as it is on established scientific evidence. As one PI put it:

> I've never seen so much emotion when you try to jump in that policy ring. It's a little hazardous, you know? But I still think it's interesting, and I think more science people do need to jump in and at least have discussion and try to have some ability to inform.

On the one hand, the means by which policy comes to be formulated, legitimized, and implemented is a deeply political process. On the other hand, the research process often seeks to find universal understandings and truths—"the right answer." Indeed, much of the academic and institutional integrity of science comes from an expectation and confidence in the objectivity and rigor of the scientific method. The value of academic researchers and their acceptance into the policy sphere thus rests upon their ability to contribute credible information and knowledge. In the context of ANR, its recognized role is to "provide knowledge to improve the quality of decisions as well as leadership to help communities find consensus on difficult issues"

(Humiston Vision Statement 2015). Yet this can be challenging when scientific consensus is lacking, when the scientific data is at odds with the values and goals of policymakers' constituencies, when the posing of certain research questions is viewed as "political" or too controversial by some constituencies and thus off-limits, or when a researcher's credibility is not a given. Indeed, for some critics over the years the overall research portfolios at land grant institutions have been viewed as supporting certain groups at the expense of others (e.g. producers rather than labor, large enterprises over smaller, conventional rather than organic). In this sense, research itself has a political dimension that cannot be ignored, even when the most rigorous standards of objectivity are maintained.

In talking about doing policy-related work, many of our interviewees mentioned the tenuous and often fuzzy line between advocacy and assertion of science. At the same time, the researchers remained committed to harnessing the power of respected science to "level the conversation" around policy by focusing dialogue on empirical evidence, results, and implications for policy. Often this means playing a knowledge brokering role between different parties, as elucidated by one of the Putting Youth on the Map co-PIs:

> So we're kind of working multiple angles. We're sort of working the regulators and the agencies on the one hand. And then the advocates on the other hand and the idea is that these kinds of data and analysis can provide a really powerful platform if we can get some of these constituencies looking at the same information. It provides a really different kind of basis for conversation that can become more substantive rather than combative or hypothetical. So those are all outgrowths of this work.

Working in this way, one policy outcome of a project can be a higher quality of policy dialog. Engaging with decision-makers and their different publics is even more critical if sound policy decisions are to be made. As one researcher said, "I think it would be good to have more influence as a scientist...how else would they [policy makers or politicians] know if they are not asking us?" For others, it also means taking seriously the public's distrust of science and addressing why that may be, along with the recognition that a healthy dose of skepticism and debate is in fact a key characteristic of the scientific community itself (and critical to the way science moves forward). Recognizing that research is never entirely neutral or value-free, ANR can still remain committed to supporting its researchers to conduct credible, honest research that is as careful and objective as possible. This aspiration was articulated nicely by one of the co-PIs on the Creek Carbon project:

> I guess my hope is without comprising ourselves and being on the verge of being advocates for one thing or another is helping people really, truly understand the tradeoffs of a particular decision and with whatever level of analysis we can provide at the time and in time, so that they're making as informed decision as they can, and not making it based on values and beliefs. And then invariably that will happen anyway.

Another PI puts it this way:

> I mean it gets to the strength of ANR, having a highly visible respected agent of the university at the local level that's credible… a track record of being credible on ticklish

issues is key. Humboldt State couldn't have done it by themselves, Berkeley couldn't do it by themselves, but having all the pieces and with the local office, the supervisors support [the project]. It's why ANR is a great thing.

ANR OPPORTUNITIES TO BETTER SUPPORT POLICY RELEVANT RESEARCH

The aim of this study is in part to help ANR as an institution internally assess and evaluate the role ANR research and extension efforts can play in the policy process. ANR is well poised to engage in the realm of public policy, but could benefit from increased internal strategic thinking about what that involvement can and should look like. On the one hand, our findings suggest that existing ANR research is often more policy relevant than may initially meet the eye, given the possibilities for multiple points of entry at different stages of the policy process. On the other hand, there are a variety of ways ANR might further develop its capacity to produce, sustain, and evaluate policy relevant research. These include:

1. Recognizing that there is more to policy relevance than direct influence on legislation by intentionally funding work that influences all stages of the policy process and uses a wide range of output forms and delivery methods to achieve policy impacts;
2. Ensuring that the merit and promotion process rewards the time spent on building relationships and on network development;
3. Developing a readily usable system for documenting policy work and impacts that can feed into ANR accountability processes, both internally and externally.
4. Clarifying institutional expectations on the line between assertion of science and advocacy in the policy sphere;

1. *Recognizing multiple points of entry and forms of policy engagement*

One key lesson from our study is that there are multiple entry points to the policy process. Many ANR researchers are probably engaged in policy-relevant research even if they do not see themselves as doing so. Becoming self-reflexive about what policy engagement looks like in different fields is an important first step for researchers as they seek greater relevance and impact. This can occur through policy trainings, structured discussions, and evaluative processes, as discussed below.

Given that smaller scale, fine-grained approaches tend to be best suited for studying on-the-ground aspects of policy adoption and implementation, there is a need to fund projects that look at local dynamics and outcomes, not just statewide issues or trends. These kinds of projects can illuminate the diversity of ways in which broader (e.g. national or state level) policies interact with and are filtered through local policies and practices, and the resulting outcomes. Cooperative Extension is particularly well-suited for this type of work.

It also might be worth examining the value of having more flexible funding available to pursue targeted and timely research as policy opportunities arise, as opposed to tying up all research funds in the competitive grants process. This might take the form of a funding mechanism to support certain projects with particular policy impact potential beyond the initial grant end date,

or otherwise allow budget/timeline flexibility to ensure the strongest potential for impact is delivered despite obstacles that might be encountered.

ANR could also consider making it even more explicit in the grants program RFP that one type of grant they will fund is projects that focus on extending and applying research findings. This approach can build on existing precedents such as the Working Landscape project, which was about getting existing information on cattle grazing as an ecosystem service to public audiences concerned about cattle in the parks. For ANR as a whole, the lesson is that there may be multiple ways to achieve greater policy impact, including funding a wider range of types of projects, including those that are primarily oriented around extension.

2. *Invest in relationships and reward relationship building*

Identifying and engaging with "end users"—usually a diverse set of actors who are making decisions in management, policy, or implementation—was a key aspect in the success of the projects, and one that most researchers mentioned when asked specifically about lessons learned. Many projects drew from ongoing relationships with open lines of communication to relevant actors in their field; a few projects sought out and developed new strategic partnerships. As one interviewee succinctly put it, "Relationships matter. Invest in relationships from the get-go." For ANR, this means that incentives in the form of funding for capacity building, training, and implementation of research tools by end-users are needed.

Furthermore, our merit and promotion processes incentivize conducting research and academic publication, but often do less to incentivize policy engagement over time. As administrative duties and publishing expectations increase, specialists and advisors have expressed that they have less time and energy to devote to the relationship building and network development that is so critical for policy engagement. ANR would benefit from an internal discussion about how to structure CE job expectations in ways that free up the time and energy needed for such relational work. It is essential that the activity of relationship building, which serves as the scaffolding for (and precursor to) policy engagement, be valued, even if it does not result in a direct "policy impact" during a specialist or advisor's performance review period

Our policy impacts tend to be strongest in areas where we have statewide programs or other administrative entities with directors or leaders who are embedded in policy networks. Another approach is for UC ANR leadership to intentionally map out policy relevant agencies that have an impact on ANR research agendas and with whom ANR can partner (for examples of such mapping tools, see Start and Hovland 2004; Court and Perkin 2005). This kind of information will help researchers understand the broader policy arena and who is responsible for decisions in particular areas/fields/disciplines. UC ANR would also benefit from investing in policy communications staff who have subject matter expertise in key ANR focal areas and who themselves are embedded in the relevant policy networks, in order to provide improved communications support for strategic dissemination of research.

As well as communications staff, government affairs and other leadership need to be conversant in the breadth of our current work, cataloging both specific projects and the fields in which ANR academics have expertise. Beyond this, ANR can be more proactive to play a "matchmaker" role

between researchers with policy-relevant research and external institutions with policy influence (or policymakers themselves). Again, the point is to build on, improve upon, and extend our existing efforts. The answer to the question of whether staff or researchers themselves bear the primary responsibility for this work should be: "both."

3. Develop a better system for documenting and aggregating our policy impacts

We have two recommendations relevant to documenting policy impacts. First, if one goal of the Competitive Grants Program continues to be creating demonstrable policy impacts, we need an evaluative tool that can encompass the diverse ways ANR engages in policy arenas and that enables all ANR academics to articulate the policy relevant impacts of their work. Such a tool can also serve to prioritize continued or additional support of projects that follow up on research with ongoing policy engagement. It also may be useful to require applicants to the grants program to identify their targeted decision-makers and the degree to which the project team has access to these individuals or institutions. For example, the PYOM and Shaping Healthy Choices projects both gave examples in their LOI summary of their relationships and partnerships with policymakers and decision-makers. They demonstrated the strength of their networks which could then be utilized to gain access to and legitimacy with key decision-makers.

Second, such an evaluative tool developed as part of the Competitive Grants Program reporting process could then inform the development of ongoing monitoring and evaluation for describing and synthesizing policy work across the division. The identified policy specific evaluation data could be incorporated into ANR's broader reporting and accountability system, to be utilized for strategic communications and advocacy, as well as federal reporting. A key function of this system would be to provide a means for aggregating the impacts across our diverse set of academics and institutions. This topic needs to be at the top of the agenda as we bring on board an evaluation specialist who could work on the development of such a system in collaboration with our program planning and evaluation staff.

4. Clarify institutional expectations on the line between assertion of science and advocacy

Despite their relative success in creating policy impacts, many interviewees indicated they would like more policy training, whether through webinars, conference sessions or workgroups at Strategic Initiative conferences or other events. Desired training includes information about what makes good policy, how to write policy, what types of research impact policy, and how to communicate with policymakers and stakeholders. There is a need for clear examples of what policy work might look like as it relates to specific research agendas (as this report highlights) and for tailored, project specific support that goes beyond a general "this is what a policy brief is" approach. Training could also focus on strategies for researchers to become self-reflexive (i.e. how am I already doing policy relevant work? How does policy impact my field?). Finally, there is a need for greater clarity about what researchers are, or are not, allowed to do in the policy arena (from a legal and professional standpoint). This last point is particularly important as many interviewees stressed their concern and uncertainty over the professional norms within ANR regarding policy engagement and the line between assertion of science and advocacy.

Within a large complex organization such as ANR, there is likely to be a range of possible, acceptable and expected levels of policy engagement, but with certain steadfast boundaries in terms of legal restrictions and professional expectations. First, ANR can clarify what these boundaries are, through written guidelines and/or webinar trainings. Then, within the realm of acceptable policy engagement, ANR can provide opportunities to train people so that they can make strategic professional decisions about how to effectively engage in policy-relevant activity, to the extent that their work intersects with policy issues.

CONCLUSION

As highlighted by this report, there is an important role for public research institutions to play in informing public policy processes. Our study addressed the key question: What strategies and practices make it more likely that ANR research projects will successfully influence public policy? In moving away from a narrow definition of policy impact simply as policy creation, our analysis of the ANR Competitive Grants program sheds light on the multiple points of entry to policy available to researchers, which more realistically reflects the dynamism and complexity of the policy process. We found that the research-to-policy trajectory is anything but linear, and instead is more accurately reflected through the following narrative:

> *The ANR Competitive Grants "story"*
> Researchers with strong contextual self-awareness of the relevance of their work are aware of ongoing issues and potential challenges related to policy and practices in their fields. Through stable and reciprocal relationships, researchers identify problems and gaps in information/empirical evidence that make "best-informed decision-making" difficult. Through partnerships they clarify the problem and develop the research approach. Balancing out many other responsibilities and demands, they secure funding and related resources for the project. They execute the project, though not always on time or in time for political openings. Through strategic partnerships and networks, researchers communicate the value and implications of their research, at times struggling to transform academic language into easily digestible information. Researchers work with diverse stakeholders who do not necessarily share expertise in their fields, but provide important feedback. Researchers work with partners in building capacity to use the research findings, often in the context of limited [academic] institutional funding for those activities. Implementation of policy-related research findings takes much longer than grant timelines, and researchers do not always get feedback from end users on tools they develop to support policy decisions.

While there are many opportunities for ANR to engage more substantially in the policy process, this endeavor is accompanied by new questions and hurdles that ANR both as an institution and as a cadre of individuals must address. As one interviewee articulated, engaging in policy work can be a double-edged sword. If we do not engage, we risk becoming disconnected and irrelevant. At the same time, there are inherently winners and losers in the policy process, such that engagement carries uncertainties and some risks. Nevertheless, as a land grant institution mandated to conduct applied research in the public interest, it is imperative that we increase our policy visibility and contributions. Hopefully our report has contributed towards this goal.

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APPENDIX

Principal Investigator Interview Guide

Background of the research and policy environments
1. How did this project proposal develop? To what extent was it developed in relation to identified policy needs/demands of policymakers, other decision makers, advocacy groups, etc? *Probe about mechanics of how researchers connected with the issue (relationships formed), if relevant*
2. Did you have pre-defined policy objectives or hopes for changing decisions before initiating this project?

The Research
3. What do you see as the major policy relevant findings of the research?*
4. Who on your research team helped with the policy impact/policy translation component in some specific way (who might be useful for us to talk with)?
5. Was there a unique research approach or engagement strategy that facilitated its policy relevance?*

The Policy Impact
6. What do you think of when you think of a policy impact—what does the phrase mean to you? What comes to mind?
7. What was/were the main policy impact(s) of this project? *
8. How exactly did this research inform a policy-making or policy implementation process? *(woven into a brief, used in a testimony, picked up by a legislative staffer, regulatory agency, etc.)
9. Was the research used by other groups *(i.e. those not directly responsible for policy-making or implementation) in any way? (business, NGOs, trade groups, advisory committees, etc.)- *was the link between the research and policy made by the research team itself or picked up and used as such by a 3rd party group?*
10. Were there interesting media or other ripple effects of the research or resulting changes to policy? *
11. Did it lead to other research or shift the research paradigm in some way? Or change the way you are thinking about your ongoing research?

Challenges
12. What was difficult about linking your research to policy? *Do you think these difficulties were specific to your project or reflective of larger structural barriers to conducting policy-oriented research?*
13. What failed/didn't work? What lessons can other researchers draw from this experience?*
14. What would you do differently next time? *
15. What might ANR do better/differently to support policy relevant research?

Opportunities?
16. What lessons do you think other researchers might glean from your project?

17. Who else should we speak with to learn about the impacts on this project on policy or decision making? *[specific probe for policy partner]**
18. Is there anything else you think we should know?*

Policy Partner Interview Guide

Background of the research and policy environments
1. What was your involvement in/relationship to the project?

The Research
3. What do you see as the major policy relevant findings of the research?*
5. Was there a unique research approach or engagement strategy that facilitated its policy relevance?*

The Policy Impact
7. What was/were the main policy impact(s) of this project? *
8. How exactly did this research inform a policy-making or policy implementation process? *(woven into a brief, used in a testimony, picked up by a legislative staffer, regulatory agency, etc.)
9. Was the research used by other groups *(i.e. those not directly responsible for policy-making or implementation) in any way? (business, NGOs, trade groups, advisory committees, etc.)- *was the link between the research and policy made by the research team itself or picked up and used as such by a 3rd party group?*
10. Was there interesting media or other ripple effects of the research or resulting changes to policy? *

Challenges
13. What failed/didn't work? What lessons can other researchers draw from this experience?*
14. What would you do differently next time? *

Opportunities?
17. Who else should we speak with to learn about the impacts on this project on policy or decision making? *[specific probe for policy partner]**
18. Is there anything else you think we should know?*

*Note: *Indicates questions asked of both project team members and policy partners (numbers brought forward from PI interview protocol)*