Participation, Process, and Partnerships

Climate Change and Long-term Stakeholder Engagement

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ABSTRACT: As awareness of the potential threats posed by climate change increases, researchers and agricultural advisors are being called upon to determine the risks that different stakeholder groups will likely confront and to develop adaptive strategies. Yet, engaging with stakeholders takes time. It also requires a clear and detailed plan to ensure that research and outreach activities yield useful outputs. In this article, we focus on the role of anthropologists as researchers and conveners in stakeholder engagement and provide a generalised overview of a long-term engagement process proceeding in three stages: (1) fact-finding and relationship-building; (2) incubation and collaborative learning; and (3) informed engagement and broad dissemination. We conclude with a discussion of perspectives and challenges that were encountered during two engagement experiences in the south-eastern United States.

KEYWORDS: agriculture, climate, engagement, methods, participation, stakeholder groups

As awareness of the potential impacts of climate change increases, scientists and professional consultants are being called upon to determine potential risks and adaptation options for different stakeholder groups. Scholars and agricultural advisory professionals (also known as extension agents) are providing stakeholders with climate-related information and tools (e.g. climate forecasts, models of future scenarios, drought/heat indices) as guidance for enhancing climate risk management and community resilience (Diehl et al. 2015; Fraisse et al. 2006). Evidence suggests, however, that mismatches between the supply side of climate-related information (research outputs) and the demand side (user needs) can result in scientific products that stakeholder groups do not adopt widely (Averyt 2010; Buzier et al. 2010; Dilling and Lemos 2011).

In order to align cutting-edge science with stakeholder needs, biophysical scientists, social scientists (and increasingly anthropologists), professional advisors and key stakeholder groups must identify mutually beneficial approaches for co-producing climate information and adaptation options (Bartels et al. 2012;

Prokopy and Power 2015). Successful knowledge co-production emerges through purposeful engagement which entails thoughtfully designed and sustained stakeholder–scientist interactions that are iterative in nature (Bartels et al. 2017). In addition, climate information is trusted, processed and utilised differently depending on cultural backgrounds, histories and experiences (Roncoli 2006; Roncoli et al. 2009). We argue that an anthropological perspective can guide co-production in a way that is better tailored to the diverse needs and experiences of stakeholders by both deepening discussions and broadening relevant themes.

In this article, we highlight the many ways in which anthropologists can contribute to such knowledge co-production processes. We begin by describing the vital role that anthropologists play in exploring and revealing the often unnoticed and underappreciated diversity within and across stakeholder groups. We then provide a generalised overview for stakeholder engagement that has served as a model in south-eastern US climate services efforts. We discuss how to structure engagement at various levels, examining

the linkages between desired project outcomes and specific types of activities. We offer a description of three stages associated with long-term engagement, including (1) fact-finding and relationship-building; (2) incubation and collaborative learning; and (3) informed engagement and broad dissemination. These three stages require an iterative process that examines the needs of specific stakeholder groups and creates spaces for biophysical scientists to learn from and with stakeholders before they develop broader outreach materials and decision-support tools.

We developed the engagement model from 10 years of interactions as anthropologists amongst biophysical scientists within the Southeast Climate Consortium (SECC), a network of universities implementing climate-related projects, between 2000 and 2015. During that time, SECC scientists collaborated with diverse water, coastal and agricultural stakeholder communities across three states, Alabama, Florida and Georgia. We draw strongly on two specific SECC engagement experiences in agriculture from the tri-state region to highlight the complexities of successfully implementing a long-term engagement process in different contexts. In doing so, we highlight the key roles that anthropologists can play as ethnographers and facilitators. Anthropologists are involved in (a) conducting preliminary research with all groups to assess their diverse interests and needs; (b) creating spaces to convene multiple actors (scientists, practitioners and end-users); (c) facilitating dialogue amongst participants to enhance communication and build mutual understanding; and (d) guiding and evaluating the entire process using ethnographic and other anthropological methods.

The Value of Highlighting Stakeholder Diversity in Developing Climate Services

Anthropologists working on climate communication have noted that, all stakeholder groups perceive, seek, and utilize climate information differently. This diversity has to do with various technical and social factors (Bolson and Broad 2013; Fiske et al. 2015). As expected, disparities are most evident amongst stakeholder groups that represent different sectors (water managers, agriculturalists, city managers) (Bartels et al. 2012; Cabrera et al. 2006; Furman et al. 2011; Furman et al. 2014). For example, forest managers might find longer-term climate forecasts more relevant to their production systems due to the perennial nature of their crops. Row-crop farm-

ers, on the other hand, may be more interested in seasonal variability timescales to guide incremental changes. Even within a single sector, like agriculture, stakeholder groups differ in their ability and willingness to access, learn and use climate information. For instance, within a sub-sector like row-crop farming, the presence of dryland versus irrigated agricultural systems can affect a grower's interest in different climate topics and tools.

Although technical aspects may appear at first to be the most important factors to consider when creating climate services, it is critical to recognise the social diversity within stakeholder groups. Social factors cut across sectoral, ethnic and class lines, and include attention to personal histories, political affiliation, economic status and ability to respond to market fluctuations (Furman and Bartels 2017). Anthropologists play a vital role in teasing out the often unnoticed and underappreciated diversity within a stakeholder group (Roncoli 2006). Valuing this diversity can result in tailored climate services that incorporate the differential needs and interests of stakeholders. Additionally, anthropology's disciplinary framework, which values longitudinal research, and our 10 years conducting ethnographic research towards climate co-production urges us to argue for long-term engagement strategies as ideal for developing an environment where stakeholders and scientists can learn from one another. Unlike in cases where the anthropology is relegated to needs assessment and evaluation, here anthropology is integral to the scientific process and guides the co-production (Verma et al. 2010).

Structuring Engagement: How Do We Engage, When, and Why?

This article argues for the development and implementation of a long-term engagement process guided by an anthropological perspective. How engagement becomes structured and activities developed, however, differs depending on the project team's goals, resource constraints (e.g. funding restrictions, project timelines, team skill sets/capacities), and stakeholders' interest in and commitment to the project. Determining the range of expected team outcomes helps inform both the potential actions and the potential methods. A purposeful plan designed at the beginning of a project that takes into account both the current and possible future stakeholder opportunities also has the potential to grow and expand towards

long-term engagement even in cases where a more incremental approach is needed.

Levels of Engagement and Research Goals

There have been a number of proposed engagement typologies in the literature dating back to the 1960s (Arnstein 1969). Since that time, ladders, pyramids and wheels of participation have helped applied scientists across multiple disciplines contextualise, shape and conduct projects that focus on local knowledge, stakeholder participation and the co-production of decision-support tools (De Vente et al. 2016; Reed et al. 2018; Rowe and Frewer 2004). Mark Reed provides a more complete review of this literature and argues that ‘the quality of decisions made through stakeholder participation is strongly dependent on the nature of the process leading to them’ (2008: 2426). Our view of engagement follows these examples. It recognises that background planning and research play an integral role in project success, as highlighted by Reed, but also as rooted in anthropology, which incorporates a holistic perspective and the use of ethnographic methods, both of which favour a long-term perspective.

Anthropologists are often incorporated into participatory projects to conduct stakeholder-related research (using surveys, interviews and focus groups) and to facilitate communication between those stakeholders and the rest of the research team (through assessment and participant observation). Since engagement is an integral part of the process, plans for stakeholder outreach and research should coincide with other aspects of the research design (e.g. when writing the grant proposal) and not be tagged on in the final stages (Reed 2008). To help ensure that stakeholder outreach fits the rest of the project design, discussions are needed concerning the group’s expected outcomes and the desired level of stakeholder input. These discussions delineate the types of actions that the engagement team needs to design. For example, when a project goal is geared towards delivering information (as indicated in the first row of Figure 1), the inherent flow of knowledge moves in one direction – from the biophysical scientist to the stakeholders. As such, the actions of the anthropologist are focused on gathering information from stakeholders and on helping inform them about the project. The inclusion of evaluation into outcomes (second row, Figure 1), which provides the stakeholders with the opportunity to share some ideas and provide feedback, creates a space for some two-way communication. However, their input is

restricted to products already conceived of by the research team, as indicated by the short stakeholder input arrow. By bringing the stakeholders into the research process early on as partners, as indicated in the third row, the space for knowledge exchange is created and stakeholders and biophysical scientists work together to develop outputs from the beginning of the project. The result is a more equitable balance of knowledge exchange that can lead to the shared development of the research process and to outcomes that are co-produced and therefore more relevant to the stakeholder population (Reed et al. 2018; Rowe and Frewer 2004).

The anthropological perspective incorporates a holistic approach that shifts the focus and widens the scope of research, and instead of treating the actions and outcomes outlined in Figure 1 as distinct or isolated it combines them into a series of steps that lead to a more holistic, long-term engagement process. Understanding the social history and needs of a community (as indicated in the first row) and further building relationships and sharing ideas (as indicated in the second row) constitute the important work that needs to precede actions associated with knowledge exchange. Therefore, if the goal of the research is to bring stakeholders into the research process and co-produce intended outputs through knowledge exchange, then collecting preliminary information and beginning the assessment process is just the first step. Preliminary data helps shape the environment for knowledge co-production between biophysical scientists and stakeholders that will ultimately provide useable scientific outcomes. This process is however not linear, as each stage in the

Actions	Flow of information to and from stakeholders	Outcomes
Inform and collect information	→	Deliver information to stakeholders and initiate relationship building
Consult and involve	↔	Improve a service through stakeholder evaluation
Exchange and co-produce	↔	Bring stakeholders into the research process and co-produce intended outputs through knowledge exchange

Figure 1. Potential Outcomes and Corresponding Actions for Participatory Projects

engagement can overlap with another stage and/or be revisited later on in the process.

Engagement Stages and Non-Linear Iteration

The stakeholder engagement process discussed here is a long-term process, not a one-time messaging opportunity (Bartels et al. 2012). We propose three distinct stages to engagement: (1) fact-finding and relationship-building; (2) incubation and collaborative learning; and (3) informed engagement and broad dissemination (Figure 2). Each stage, with the exception of the first, builds on the one before it, and the objectives of each stage drive the selection of methods. Furthermore, the types of stakeholder groups engaged and the goals of the project shape the design of interactions, the number of participants involved, and the range of activities pursued. Although the model of long-term engagement appears linear in Figure 3, it calls for flexibility and iteration, such that activities move back and forth across stages according to need. For example, discussions in Stage 2 may necessitate a need to revisit and explore findings from Stage 1. Furthermore, Stage 2 learning continues during Stage 3 activities, as the incubator group is expected to assess outputs. Group composition is also designed to be somewhat elastic (adding not subtracting members) to allow for new perspectives or the needed infusion of expertise.

Stage 1: Fact-Finding and Relationship-Building

The initial stage aligns closely with traditional anthropological methods and theory, wherein the problem is identified, the community is defined, and the social context begins to be developed. As with

many applied projects, the initial interactions with stakeholders can be initiated by community champions seeking guidance on a specific problem (e.g. climate risk management). In other cases, biophysical scientists themselves may identify the absence of certain stakeholder group perspectives and reach out to community leaders. Early activities include (a) recording and chronicling stakeholder experiences, knowledge and attitudes; (b) assessing needs and identifying general concerns and questions; and (c) relationship-building and goal-setting. Sample size is dependent on the characteristics of the community and aims to capture a wide range of perspectives and insights, and therefore methods can be revisited if specific questions arise later on in the course of the project. Methods commonly used to guide the preliminary development of information services include key-informant interviews, rapid assessments, surveys, and focus groups that reach large numbers of stakeholders (Furman et al. 2011). It is important to reiterate that the methods in Stage 1 primarily constitute one-way flows of information and provide limited space and time to explore deeper questions or problems. Even with focus groups and the facilitation of open dialogue in workshops, these actions and methods have a limited ability to generate full two-way communication. As such, biophysical scientists may sometimes miss important cues or misinterpret data during Stage 1. Therefore, it is ill-advised to jump from Stage 1 directly to Stage 3 without exploring Stage 2, where a more in-depth analysis of stakeholder expertise, activities and interests intersects with what the academic community can offer.

Figure 2. Long-Term Engagement. The chart tracks the long-term engagement process through time for climate engagement. Each phase is represented by a shaded block, and the relative number of stakeholders engaged is represented by the area shaded in light grey.

Stage 2: Incubation and Collaborative Learning

Based on interactions in Stage 1, incubation activities can be conducted with those motivated individuals from both academia and the identified stakeholder group. Due to the high level of time commitment and the intensity of interactions, the sample size is small. A team of anthropologists and outreach specialists works to develop and assess the incubation process. One anthropologist is generally positioned as participant-observer with other members (depending on group composition) acting as facilitators and coordinators (see Furman and Bartels 2017). This ethnographic team approach is critical. While Stage 1 findings inform facilitation, the continued participant observation, analysis of assessment surveys (typically administered during incubator activities) and stakeholder interviews all shape and shift specific agendas and activities.

Incubation and collaborative learning processes occur in small groups or communities of practice that are developed to enhance knowledge exchange and problem-solving. This stage features interactive methods such as farm-based field trips, collaborative experimentation, systematic evaluation of adaptation options, scenario-building and/or simulation games. The uniting factor amongst these activities is a commitment by participants to meet regularly over time to discuss and reflect on questions and findings. Interactions are designed to facilitate safe spaces where listening is valued so that all participant perspectives are heard and validated, and to ensure open dialogue between biophysical scientists and stakeholders. Repeated direct contact between scientists and stakeholders spark new understandings and questions that catalyse unexpected research directions or reframe outreach products. Scientists benefit by reassessing their research and outreach, while stakeholders obtain deeper understandings of what science can offer and how their insights might guide the development of new tools and information.

Stage 3: Informed Engagement and Dissemination

Insights and findings from Stage 2 can turn into stakeholder-driven climate tools, information, and outreach activities. The role of the anthropologist in Stage 3 is to help facilitate communication flows, direct attention to ideas and concepts from under-represented groups, and guide assessment and feedback for products to ensure appropriate tailoring. The products that arise in Stage 3 are co-developed and come about because of the close work conducted in Stage 2. In other words, they are developed by or directly arise from biophysical scientist and decision-maker interaction that the anthropologists designed and facilitated. These co-developed products are tested amongst broader groups of stakeholders who have similar interests and needs. In this way, although tailoring is done within small incubation groups, findings and lessons can be expanded to reach wider populations of stakeholders with similar characteristics. Ideally, multiple incubator groups both within and across sectors would concurrently be developed. Coordination across these groups can reveal places where ideas, tools and processes overlap so that efforts in form, process and dissemination might permeate from one group to another. Although activities move to Stage 3, maintaining a Stage 2 group can allow biophysical scientists to continue to develop, test, assess and modify products. This process is therefore not linear but iterative,

which is illustrated in these experiences that we review from the south-eastern United States.

Creating useful information and tools requires the collaborative work of many people and the integration of multiple knowledge systems. Often, the anthropology team organises efforts and brings diverse experiences together. Therefore, it is valuable to consider the roles of the other participants. Depending on their experiences and interests, other types of scientists may play an active role in Stage 1 needs assessments as relationship brokers, designers of interview questions, or presenters – and always as active listeners. Others may be more involved during the examination of adaptation options in Stage 2. The extent to which technical- and disciplinary-oriented biophysical scientists participate in Stage 1 and Stage 2 can help ensure that products generated in Stage 3 are more grounded in stakeholder needs and interests. Stakeholders can also play more active roles as well. For example, an auxiliary stakeholder team can form in Stage 1 that helps develop research objectives and suggests Stage 2 participants. This same group can also participate with the Stage 2 incubator group as Stage 3 products are assessed and refined. In general, the key is to consider the backgrounds and interests of the biophysical scientists and stakeholders when proposing how they will engage with another.

Climate Engagement Experiences from the South-Eastern United States

To illustrate the three-stage model of long-term engagement, we share experiences from two agriculture stakeholder communities in the tri-state region of the south-eastern United States. For 15 years, anthropologists have worked with multi-disciplinary teams of biophysical scientists and stakeholders on various agriculture- and climate-related projects within the Southeast Climate Consortium (SECC). The region's major row crops (peanut, cotton, soybean and corn) are affected significantly by inter-annual climate variability and the El Niño Southern Oscillation (ENSO). SECC scientists studied ENSO climate patterns and provided probabilistic seasonal forecasts to producers with the assistance of extension agents (agricultural advisory specialists employed by the university system) (Bartels et al. 2012; Breuer et al. 2008; Cabrera et al. 2006).

Seasonal forecasts represent an important step towards helping farmers reduce risks. However, anthropology research illustrates that this information is much more useful when farmers' planning is

strategic and when they have skills and the ability to improvise, experiment and learn and to adjust their practices in relation to the climate information. Research into different agricultural systems in this region have shown that growers remaining productive on the landscape have been able to overcome market instabilities, unfavourable policy changes and variations in climate and weather by using a variety of adaptation strategies specific to their production type and available resources (Crane et al. 2010; Furman et al. 2011; Furman et al. 2014).

Since the two engagement processes that we feature in this article occurred in the same region, with the same SECC science team, and with overlapping funding, they appear to be very similar in nature. However, an ethnographic lens reveals how stakeholder group differences, varying community histories, and funding specificities related to each project shaped the pathways and engagement outcomes. Furthermore, and rather importantly, anthropology reveals ethical and political dimensions that can provide insights that can challenge and improve project design as well as subsequent research development.

Experience 1: Limited Resource Farmers

In 2008, the SECC began a project with African American farmers, an agricultural community that land grant universities had not previously reached through extension or with climate outreach. SECC anthropologists partnered with the Federation of Southern Cooperatives Land Assistance Fund (FSC/LAF), which represents farmers from across the south-eastern United States, has an interest in risk management, and had expressed interest in climate services.

The focus for the initial National Oceanic Atmospheric Administration/Sectoral Applications Research Program (NOAA/SARP) funded research centred on fact-finding and relationship-building (Stage 1) to initiate climate research and outreach. Headed by anthropologists who reported to the SECC team, interactions focused on collecting background information and insights that would eventually inform progression into Stage 2 (collaborative learning) and Stage 3 (tool development). Fact-finding research conducted through surveys and interviews with African American farmers explored climate needs, adaptation strategies, extant sources related to weather and climate information, sources of climate knowledge, and potential uses for climate information. In addition, anthropologists participated in and observed interactions of farmers at small conferences and field days, which helped them define protocols

for data collection, informed them about group norms, and helped them build and maintain relationships with farmers and other agricultural advisors who served this community (Furman et al. 2014).

Following the completion of the SARP project, a second project, funded by the United States Department of Agriculture/National Institute of Food and Agriculture (USDA/NIFA) (which also funded Experience 2 below) allowed biophysical scientists to engage with this same community. However, budget constraints greatly limited the amount of funds available for the FSC/LAF, restraining staff members' availability to participate in the project. Regardless of this setback, the anthropology team and FSC/LAF staff conducted two climate workshops (one in Georgia and one in Alabama) to convene farmers, FSC/LAF extension professionals and SECC biophysical scientists. The anthropology team designed the workshops to build relationships amongst farmers and between farmers and scientists, moving the process from a one-way exchange of information towards consulting and exchange. Farmers shared their farming history, focusing on climate and information access, to enlighten scientists about the particular barriers and opportunities that their community had faced. Climate scientists explained the El Niño Southern Oscillation (ENSO) cycle and discussed the upcoming climate outlook, all of which was information of expressed interest to the farmers present (see Furman and Bartels 2017).

Following the workshops and by request of the FSC/LAF board, key members of the FSC/LAF staff and SECC scientists participated in a round-table conference in 2014. The anthropology team facilitated the round table, the goals of which focused on (1) developing a common framework for working together in the future; (2) envisioning a way to conduct responsible research, build capacity and maintain relationships with both the FSC/LAF and African American farmers in the south-eastern United States; and (3) establishing a common language to aid in developing an *enduring* risk management climate partnership. This round table further solidified relationships and helped communicate to all participants (biophysical scientists and stakeholders) the need to continue to engage with this community.

Since the FSC/LAF and associated African American farmers were a new stakeholder group for the SECC, research focused primarily on fact-finding and relationship-building. The round-table did, however, advance interactions to Stage 2, incubation and collaborative learning. Discussions began to incorporate stakeholder-identified issues and set the stage

for brainstorming creative new directions for research and outreach. Yet, an additional infusion of funding (distributed equally between the organisations and universities) was needed to move forward and deepen idea incubation. A new project would support the maintenance of the emerging learning network to cover the costs associated with workshop planning and coordination, biophysical scientists' and stakeholders' time, and logistics costs (meals, venue rental, travel, etc.).

Experience 2: Tri-State Row-Crop Climate Learning Network

In 2007, the SECC climate research team focused on fact-finding and relationship-building (Stage 1) with row-crop farmers in Georgia and surrounding regions. Anthropologists conducted interviews and participant observation to determine specific needs related to climate services (Crane et al. 2010). Partnerships with extension agents and professionals helped the biophysical scientists establish contact with farmers. In addition, the extension agents themselves became key consultants, contributing their expertise and experiences.

In 2010, based on the findings and conclusions from Stage 1 activities, a new SECC anthropologist team propelled the partnership to Stage 2 of engagement. A tri-state climate learning network began to convene agricultural stakeholders from Florida, Alabama and Georgia for a collaborative assessment of adaptive strategies to reduce climate risks. An anthropologist designed and facilitated network workshops biannually to promote ongoing interactions amongst scientists, producers and extension professionals for knowledge exchange, dialogue and learning. Activities emphasised hands-on, peer-to-peer discovery and included on-farm field visits, in-depth reflection and discussion, as well as critical analysis of seasonal climate forecasts, decision-support tools, and experimentation. The goal was to allow local experiences to influence research directions (and *vice versa*), thereby cultivating more resilient row-crop production systems and sustainable rural livelihoods.

Network activities were funded by the Bipartisan Policy Center, National Oceanic Atmospheric Administration (NOAA), and the Department of Agriculture/National Institute of Food and Agriculture (USDA/NIFA) project discussed above. Participant observation, project assessment, and interviews with participants were key anthropological data-generating methods that shaped the activities of the tri-state learning network. Between 2010 and 2018, the network held 18 workshops, reached 173 partici-

pants, and examined a range of potential adaptation options, such as drip irrigation, pond-water harvesting, and planting new drought-tolerant crops, like sesame. Participants explored climate risks across multiple timescales from seasonal variability to long-term climate change (see Bartels et al. 2012).

Stage 3 outputs included peer-reviewed publications, videos, conference presentations as well as sustained relationships. Members of the learning network informed and/or assessed each of these outputs. Since the network is constantly evolving, it has strengthened partnerships and expanded expertise beyond academia and extension to include government agencies, farmers' associations, private companies, and civic groups focused on soil and water conservation.

The eight-year lifespan of the tri-state network successfully demonstrates a new and powerful role that anthropologists can play in conducting interviews with extension agents and producers in Stage 1 to guide the design of Stage 2. As conveners and facilitators of engagement, they also use ethnographic methods to study the group experience and promote learning amongst participants, informing Stage 3 outputs. Today, anthropologists in the tri-state network have transferred ownership of workshop coordination to extension partners as participants continue to meet even past the lifespan of the funded projects.

Evaluating SECC Engagement Processes: Perspectives from Participants

Upon completion of the USDA/NIFA-funded project, which provided at least some funding to both the tri-state learning network and limited-resource farmers, anthropologists conducted a survey amongst participating SECC scientists. Findings provide insight on how they interacted with stakeholders, perceptions about participatory research, and lessons learned.

Figure 3 illustrates responses from scientists concerning their motivation to engage with stakeholders. Although funders often favour projects that have explicit designs for stakeholder engagement, more than half of the scientists did not indicate that as a motivator for engagement. Responses (agree and strongly agree) indicate that research interests drive them to incorporate stakeholder perspectives for locally appropriate outputs, research design guidance, and consensus-building.

The following discussion focuses on questions pertaining to the tri-state network as the Federation of Southern Cooperatives Land Assistance Fund (FSC/LAF) had not transitioned extensively into Stage 2, and therefore few scientists felt that they had gained

Figure 3: Motivation. What motivated biophysical scientists to engage with stakeholders during the NIFA/USDA project that encompassed both the tri-state network and FSC/LAF stakeholders?

much from the partnership beyond obtaining some basic information and a sense of how stakeholder engagement contributes to their outputs. When asked ‘did participation in the tri-state network impact your outputs or work?’ (n=11), 55% of the respondents indicated ‘yes’, 28% were not sure and 17% indicated ‘no’. Those who indicated ‘no’ or who were not sure had little direct involvement with stakeholders. Those who indicated ‘yes’ were more actively engaged, with one of them making the following statement:

Working with the tri-state group helped me better understand some of the agro-climate resources as educational, rather than strictly decision-support. The tri-state network also produced research questions and methods that led to some interesting extension materials and peer-reviewed publication.

And another scientist remarked:

[A specific website developed] was a product that resulted from my understanding of perceived needs for information [expressed by] Georgia farmers participating in the tri-state group.

Post workshop, tri-state stakeholders completed exit surveys to shape subsequent workshop design

and direction. When asked what motivated attendance, 61% reported that networking (relationship-building) and information, the key goals of Stage 2, kept them engaged (n=46) and 39% cited an external factor (free lunch 4%, boss 7%, project facilitator encouragement 28%). In a 2016 exit survey, 15 of 16 stakeholders reported having changed an agricultural decision based upon the previous seasonal forecast, rating that information as somewhat, very or extremely useful.

Feedback concerning the form of engagement and information was positive. Scientists reported personal and project work benefits. Stakeholders expressed the value of agricultural insights, which justified their time commitment. However, several constraints centred on issues of funding and the culture of academia.

Limitations and Challenges

The first main constraint to long-term engagement relates to research team composition, which is defined during the initial proposal-writing phase of the project. Yet, during engagement, as stakeholders become involved, new and divergent requests emerge

that even the most multi-disciplinary group of scientists may be unable to meet. In the case of the Federation of Southern Cooperatives Land Assistance Fund (FSC/LAF) experience, the staff wanted to link questions of climate services to concerns of rural poverty and land ownership, which the Southeast Climate Consortium (SECC) team lacked the expertise to address. Therefore, successful collaboration entails spending more time during Stage 1 to establish appropriate expertise, having the flexibility to expand the research team during Stage 2 and redirecting project goals, and situating key stakeholder partners as active proponents of the proposal-writing process.

The second challenge relates to sufficient, timely and sequential funding. Project cycles do not match the time needed to move through the three stages of a long-term engagement process. Funders tend to support research for one to five years, which may only sustain activities for needs assessment in Stage 1 or catalyse initial Stage 2 interactions, as illustrated with the limited-resource farmers. Multiple multi-year grants funded the experiences we describe, which suggests that if project participants have a long view of research in mind, they can work together to get the different stages funded separately but in succession. However, such an approach requires a great deal of commitment and coordination. The FSC/LAF experience shows that, although Stage 1 was funded, the team was unable to expand the project into Stage 2 due to a lack of participant commitment to seek additional funding. This is partly because the FSC/LAF is a non-governmental organisation and therefore does not have large institutional budgets to leverage staff salaries and travel. This is a common problem that could be resolved if funding agencies would set aside separate funds that minority or limited-resource groups could access when they partner with larger institutions. Because the tri-state network is tied more directly to university extension systems and because those stakeholders had longer histories with the scientists, it was able to leverage funding and reach Stage 3. As such, both scientists and stakeholders were able to realise the benefits of engagement. Also, short funding cycles demand rapidly developed outputs, which is uncharacteristic of typical anthropological enquiry. In these cases, the anthropologists need to work with the larger group and negotiate expectations early.

A final critical issue relates to the culture of academia. Engaging with stakeholders and bringing them into the research and outreach process often results in requests for information and products that scientists do not have the desire, time or expertise to

develop. The academic reward system of prioritising innovative outputs that drive peer-reviewed publications and presentations shapes how biophysical scientists interact with stakeholders. In our experiences, stakeholders often asked for information or tools which, while locally relevant, were not innovative in scholarly terms or were not scientifically cutting-edge. For example, many farmers preferred print material over high-tech computer-based solutions. Furthermore, for biophysical scientists and scientists, participation in the climate network sometimes meant attending meetings to listen and not present. Although scientists found listening to be valuable, reporting listening as an activity to their home departments was difficult. Due to these constraints, they were often limited in their ability to participate.

Our findings resonate strongly with Juan Pablo Alperin and colleagues (2018), who call for systemic change to how research and tenure procedures incentivise scholarship for the public good. They suggest re-conceptualising public-oriented work as central to knowledge generation, rewarding alternative outputs, and appreciating unquantifiable research-related activities. Our work highlights the need for placing an equal value on Stage 1 and 2 engagement activities (such as relationship-building and listening) as those outputs from Stage 3. Furthermore, we advocate for a deeper appreciation of academic staff involvement in the entirety of long-term engagement processes towards continued learning and knowledge generation with stakeholders (versus extractive data collection/presentation from/to stakeholders). Funding agencies could help the process by placing a value on activities that focus on listening and learning.

Conclusions

Engaging with stakeholders about the effects of climate change and exploring adaptation options takes time and necessitates a clear and detailed plan to ensure that outreach and research activities yield outputs that are useful to stakeholder groups. This is further complicated by the fact that stakeholders use climate information and services in decision-making differently depending on factors such as sector and role (e.g. county agricultural Extension agent, municipal water manager, coastal development planner), sub-sector composition (e.g. farm/municipality size, production type, previous experience, perception of risk, resources available), and political, ethnic or class affiliation. This means that work towards co-production needs to dig deep into community dynam-

ics, cultural differences and diverse ways in which climate services are understood, interpreted and used. As argued by Carla Roncoli and colleagues, ‘anthropology’s potential contributions to climate research are the description and analysis of [the various] layers of cultural meaning and social practice, which cannot be easily captured by methods of other disciplines, such as structured surveys and quantitative parameters’ (2009: 87). The work we discuss in this article was developed within the disciplinary ethos of anthropology and deployed into multi-disciplinary research projects as a way to better inform the production of climate services. We work to tailor engagement so that we reach and learn from the widest span of stakeholder groups, which requires the development of purposeful engagement strategies that are appropriately suited to user needs (demand) with relevant information (supply). We recommend tackling the problem of matching the supply and demand of climate services by pursuing engagement as a long-term process, akin to deep ethnographic investigation, and focusing on building partnerships and networks versus viewing the endeavour as a one-time workshop or meeting. The application of anthropology’s holistic approach to research (and facilitation) takes into account stakeholder and scientist histories, perspectives, and needs, and it focuses on long-term relationship-building. We offer a long-term engagement framework and argue that this approach can result in the development of novel understandings, co-produced knowledge, and expanded programmatic directions. It is important to emphasise that focusing on dialogue and partnership-building takes concerted effort, time, skills and resources; but the reward is a more nuanced array of climate services and emergent, productive stakeholder–scientist networks.

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