980 NINTH STREET, SUITE 1500
SACRAMENTO, CALIFORNIA 95814
HTTPS://DELTACOUNCIL.CA.GOV
(916) 445-5511

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Date: February 6, 2020

To: Delta Social Science Task Force
Sent via e-mail to socialsciencetaskforce@gmail.com

Delta Stewardship Council
Sent via e-mail to
Rachael.Klopfenstein@deltacouncil.ca.gov

From: Delta Independent Science Board

Subject: A Social Science Strategy for the Delta: Observations and Recommendations

The recently released draft report*, A Social Science Strategy for the Sacramento-San Joaquin Delta* (hereafter the *Strategy*)*,* by the Delta Social Science Task Force discusses the challenges of integrating social scientists into the Delta Science Enterprise, which has been largely the domain of natural scientists. The problems of the Delta considered in the context of the coequal goals have to do with the environment and its resources (the domain of natural sciences) as well as people (the domain of social sciences). Thus, both natural and social sciences are essential to addressing those problems. This report, however, appears to only deal with one of the coequal goals; water reliability is not discussed in depth.

It is well acknowledged and widely known that communication across different disciplines, and their consequent approaches to understanding, is an overarching challenge.[1] Therefore, integrating social scientists—whose words have different meanings, who write in different styles, and who frame problems and conduct research in their own ways—entails numerous communication quandaries. How to kick start the process—who to kick, how, and when—is not clear. Our own review of the report struggles with this dilemma.

The *Strategy* itself both speaks to and reflects this communication challenge. It frequently acknowledges the communication issues, especially when beginning the process of integrating the different disciplines, while also noting that doing coupled human-natural systems thinking requires extra time for researchers to communicate across their disciplinary barriers. The *Strategy* reflects the communication problem in

[1] We are reminded of C. P. Snow's 1959 lecture on "The Two Cultures" about the "gulf of mutual incomprehension" between the analytic-empirical culture of science and the interpretive-historical culture of the humanities. In Snow's day, the social sciences were mostly in the humanities. Today, more social scientists are users of quantitative data and particular analytic models, although many still remain interpretive-historical.

that natural scientists have asked social scientists for help but the help has arrived in a document that is difficult to read and sometimes a bit irritating for natural scientists. We found that the report is repetitive and defensive about the need for natural scientists to be more respectful of what social scientists have to offer and about the neglect that they have felt in the past. While this has some truth to it, it's not all that helpful in terms of the context of this report. It might have been more compelling to natural scientists if it had been written as natural scientists would have written it, but then the information provided would not be the same.

This communication gap is the first major challenge. Are social scientists obligated to learn how to communicate with natural scientists, or are natural scientists obligated to learn social science words and communication styles? Some portion of each group will need to immerse themselves in the cultures of the other and learn their words and styles. But communication across disciplinary cultures requires considerable time and effort, more than the already-considerable effort needed to integrate the knowledge of hydrologists, toxicologists, fisheries ecologists, ecosystem scientists, etc. in the natural sciences. This leads to our comments below.

First Observation and Recommendation

The charge to the Delta Social Science Task Force asks for a creation of a strategy on how "to integrate the social sciences into Delta Science Enterprise." As a consequence, the *Strategy* tends to refer to social sciences in the abstract while also pointing out that the social sciences are very diverse and that different types of social scientists will be needed for different tasks undertaken in different agencies. The report takes pains to clarify the multiple dimensions of the social sciences (although it is remiss in failing to acknowledge the potential contributions of Traditional Ecological Knowledge—i.e., insights from ethnoecology; see Zedler and Stevens 2018). Clearly, managers and decision-makers should be encouraged to align specific problems and needs with the most appropriate expertise, be it in the social sciences, natural sciences, or both.

The Delta Science Enterprise deals with ensuring both quality of life for humans and sustenance of ecosystems; therefore, social sciences are integral parts of Delta science, although the linkage is often overlooked. Delta science needs linkages to the academic social science community. While the *Strategy* notes the presence of this broader community, the implications of linking Delta science with social scientists are not well developed.

One important thing that is not stressed adequately in the *Strategy* is that universities have long been producing and employing *environmental social scientists*. There have been water economists for over half a century, many of whom learned how to speak effectively to water engineers and scientists. Over the past quarter century, other social science students have accepted the challenge of learning particular environmental sciences in order to work and communicate within the areas of energy,

climate, and species conservation. Most likely, the need is for this type of social scientist, i.e., someone who has chosen to be an ***environmental*** social scientist and who will be able to work with Delta scientists on particular issues. Such scientists can provide the linkages among other environmental social scientists in academia, science-based NGOs, and even to more theoretical social scientists.

Graduate programs have been producing environmental social scientists for over a quarter century. In these programs, students typically choose their own environmental focus. To date, few social scientists have chosen the Delta as a study area.[2] We want to assure Delta scientists that we are not advocating bringing in social theorists with no grounding in natural systems.

In actuality, the communications gap is not as wide as it generally seems to be portrayed in the *Strategy.* Ways of reducing the gap already exist if the charge to the Delta Social Science Task Force can be portrayed in this larger context. The *Strategy* occasionally addresses these linkages and can do more, but with its mandate portrayed more appropriately, it could do so much more effectively.

First Set of Recommendations

a. The Delta Science Program and the Delta Social Science Task Force need to move on from the initial charge and the good work already undertaken within the Delta science community and help to develop a more comprehensive linking to academic and NGO environmental social scientists, who will then provide the links to more theoretical social scientists when needed.

b. The *Strategy* should more explicitly recognize that environmental social scientists[3] are bridging the conceptual and language barriers between environmental and social science thinking; they will be the ones most likely to integrate the social sciences within the Delta science community.

c. The *Strategy* needs to more effectively address how to encourage California's environmental social science graduate students to take on the Delta as an environmental focus in this more systemic framing of the charge.

d. To increase understanding between social environmental and natural environmental scientists, workshops could be organized to address their similarities and differences. Input-output models in economics and food-web models in ecology have a common structure, and often a set of similar linear

[2] Given the training and experience of the Delta Social Science Task Force members in environmental social science, they may have themselves presumed they were already saying this, but this is not how the report reads.

[3] This assessment uses the term "environmental social scientists," leaving "social scientists" in the abstract for those working primarily within their disciplines rather than across disciplines.

equations. Joining these seemingly disparate fields is easy because they share the same underlying pattern of thinking. Landscape ecology emphasizes the spatial aspects of ecological processes. Spatial thinking in the social sciences has long been part of human geography but has expanded as improved spatial data and modeling techniques have strengthened spatial thinking in other social sciences. Hierarchy thinking in ecology has analogs in some social systems thinking. Such workshops should stress both the similarity of underlying models and the differences in the vocabularies of researchers in the social and natural sciences using the same underlying pattern of thinking. In the Delta Independent Science Board's own experience, a workshop was a key component of bringing "Delta as Place" to the forefront of their thinking and awareness.

e. The creation of a position in environmental social sciences in the Delta Science Program is a key first step. Such a person could initiate open discussions among natural scientists and social scientists about their biases about the social sciences and vice versa, and should be able to work some of these differences through to enrich each other's understanding and ability to work together. These discussions should aim to create a cultural change in which the fabric of thinking for social sciences is seamlessly integrated into the work of natural scientists, so that the results presented to managers and decision makers embody both perspectives.

Second Observation

The Social Science Task Force was set up by the Delta Science Program to make recommendations for the Delta Science Enterprise as a whole, not just the Delta Science Program. The *Strategy* is broadly Delta agency-focused and mostly speaks to the agencies. This makes sense given the goal of developing a community of Delta environmental social scientists working in many different agencies. Furthermore, different agencies will likely want different types of environmental social scientists. There are good reasons for the agency-wide approach.

However, by speaking broadly to the Delta Science Enterprise, the *Strategy* is burdened with several problems. First, it is clear that the Delta Science Program has taken the lead on bringing in the social sciences and, once it adds an environmental social scientist to its staff, will be in the best position to keep the integration process moving ahead. Second, the *Strategy*, by speaking to environmental scientists Delta wide, neglects the need for managers and policymakers to become better versed in the environmental social sciences to make use of new research findings, understand management options, and advocate for social science positions.

Second Area of Recommendations

a. It might be better for the Delta Social Science Task Force to have specific recommendations for the Delta Science Program and broader recommendations for the Delta Science Enterprise. The Delta Social Science Task Force's Recommendations 1 to 3, for example, most likely should be acted on by the Delta Science Program.

b. The report needs to emphasize that improved understanding of the environmental social sciences at managerial and policy-making levels is also needed.

Third Observation

Management and policy decisions are made by people, with peoples' interests in mind. Understanding the forces that influence decisions can be enriched by drawing from the array of knowledge and methods of the social sciences. But many of the problems of the Delta have to do with the environment and its resources, so information from the natural sciences is needed to make informed decisions. The California legislature has mandated environmental goals that it presumed could be best met through the expertise of natural scientists and environmental engineers. Those trained in the natural sciences have, in effect, legislative mandates from the state to accomplish these goals. Environmental social scientists do not have legislative mandates in the Delta or in many other environmental problem hubs.[4] This may be a difficult problem to overcome.

The structure of Delta agencies, designed from the earlier environmental science perspective, leaves no obvious places for environmental social scientists. The *Strategy* acknowledges this problem at its very beginning. The process of preparing the *Strategy* itself included an exercise in which agency scientists envisioned how social scientists might help fix this problem and possibly fit into their agencies. The process of preparing the *Strategy* also included an excellent workshop in which environmental social scientists from outside the Delta showed how the environmental social sciences helped frame and resolve environmental problems elsewhere. The *Strategy* suggests that agency scientists start formally envisioning the Delta as a coupled human-natural system or provide some other vision to show how social science expertise might best

[4] An exception has been economists who conduct benefit-cost analyses for water projects, help optimize systems design and regulation in electricity, and help account for greenhouse emissions and design incentives to control greenhouse emissions and enhance sequestration. The *Strategy* notes that natural scientists and engineers have found economists easier to work with than sociologists, for example, but could also note that economists have had legislative mandates starting with the Flood Control Act of 1936 that mandated benefit-cost analysis. Delta water flows are affected by water trading long advocated by economists. Economists have assisted in the evaluation of ecological restoration of the Yolo Bypass.

fit in. Lastly, the *Strategy* acknowledges that the *Delta as an Evolving Place* clause in the 2009 Delta Reform Act provides a legislative entre for bringing the social sciences into the process. On the other hand, some natural scientists seem to sense that there is no obvious way to physically "house" natural and environmental social scientists together.

Third Recommendation

The *Strategy* could document insights from one subfield: the social study of science and society (or the earlier field of Science, Technology, and Society) and how social scientists in this field understand the broad structure of science and policy, agency structures, and cultures within science and how they interact in society. Using the Delta as an example would also help make the *Strategy* more Delta-specific.

Fourth Observation

While the Delta Social Science Task Force rightfully critiques the absence of social science or plans for its promotion in many reports, the *Strategy* itself could connect better with past and ongoing studies, especially those with prominent "human dimensions." Examples of this could be included.

Fourth Recommendations

The *Strategy* calls for an envisioning process of how the social sciences interrelate with Delta issues. The *Strategy* could note that one such process was undertaken by the consulting firm, ESSA Technologies Ltd., as a part of the Delta Independent Science Board's Monitoring Enterprise Review (see prospectus). In addition, the absence of any mention of this ongoing review, even though it was brought to the Delta Social Science Task Force's attention, lends an aura of incompleteness to the entire report.

Fifth Observation

The *Strategy* makes frequent reference to the importance of adaptive management (AM) in addressing the coequal goals for the Delta. AM is a process of doing science. As such, it entails both natural and social sciences, although the two groups view the process in somewhat different ways. To many natural scientists, the strength of AM lies in how information is gathered and analyzed to determine whether a management action is producing the desired results. Empirical methods are used to conduct experiments, test hypotheses, and monitor a system following established scientific procedures, and the results are analyzed and interpreted using statistics, models, or other science tools. Social sciences come into play in framing the initial management goals and when the results are translated and communicated to managers and decision-makers, who then determine whether adjustments are needed depending on societal factors as well as the findings of the natural sciences.

Social scientists emphasize that the entire process of AM is done by people who have prior ideas, who need to talk to each other to understand complex systems, who need to interpret when the complex system has gone in unintended directions, and who then need to reinterpret what is happening, what research would reduce uncertainties, and so on. People working together advise management, who are people too. Social scientists see all of this as a social process; in contrast, natural scientists tend to focus on the nuts and bolts of how data are gathered and analyzed and how the assessment of the effectiveness of management actions is carried out.

This difference in how the process of AM is viewed highlights the difficulties of communicating among the disciplines and the importance of integrating the natural and social sciences. Thus, the statement in the *Strategy* that "in the absence of social science input and tools, it is unlikely that adaptive management will be effective" (page 44) may seem obvious to a social scientist but may strike a natural scientist as an overstatement that ignores the core strength of AM provided by the knowledge, information, and methods of the natural sciences. Further, the *Strategy* suggests that AM may sometimes be used as a convenient way of delaying actions or a way of achieving political ends. This attributes motives to the use of AM that rarely, if ever, characterize how AM is actually used in the Delta.

Despite the importance of AM as a way of integrating the natural and social sciences in the Delta, the treatment of AM in the *Strategy* ignores much of the literature on AM. In particular, the review and publication from the Delta Independent Science Board that evaluated the use of AM in the Delta (Wiens et al. 2017, and highlighted the role of social sciences in the process) are not mentioned. The *Strategy* correctly notes that AM is not appropriate for every management situation (page 44); this problem was discussed in detail in the Delta Independent Science Board report. Other literature (cited in the Delta Independent Science Board documents) has been similarly ignored.

Fifth Recommendation

The *Strategy* should recognize the power of AM as a way of integrating natural and social sciences together into management of the Delta. AM will not be effective without such integrated efforts.

A Final Observation

The charge to the Delta Social Science Task Force stated the objectives of strengthening the integration of social sciences with the natural sciences and nurturing social science research. The *Strategy* does this well, highlighting several general recommendations.

However, the charge also asked the Delta Social Science Task Force to address a series of "how" and "what" questions that provided the opportunity to probe more deeply and, in the process, inspire more directed actions to achieve the general

objectives. In the *Strategy,* these questions are addressed only superficially or not at all. For example, the report suggests that social and natural science might be integrated by “conjoining social and natural science as distinct lenses on the same issue and combining the natural and social science data into integrated models to understand an issue” (page 40). Some specifics would add meat to these bones. The opportunity to demonstrate the value of insights from the social sciences was missed.

The “how” and “what” questions in the charge are important. They can form the framework for a continuing development of a strategy to integrate the natural and social sciences to achieve the aims of the coequal goals in the Delta.

We thank the Delta Social Science Task Force for providing the impetus to bring more effective social sciences research to the Delta Science Enterprise. Our recommendations are intended to advance this process in achieving better management of Delta resources.

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