

Expertise and Inequality Amid Environmental Crisis: A View from the Yukon-Kuskokwim Delta

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ABSTRACT Scientific expertise is crucial for responding effectively to environmental crises. Nevertheless, under conditions of political inequality, expert policy making can inhibit policy solutions by altering incentives of powerful interest groups. This is the situation facing the predominantly Alaska Native communities of the Yukon-Kuskokwim Delta, which have long relied on salmon for subsistence and are now experiencing a collapse of the salmon population. Scientific evidence indicates that climate change is a primary cause, and experts therefore have opposed demands by Native subsistence fishers for ameliorative measures—especially restricting pollock fishing—as likely to be ineffective. However, this approach eliminates incentives for the influential pollock industry to support policies to address the salmon crisis, including climate-change mitigation. This article presents a simple formal model that demonstrates these incentive effects. This argument contributes to theories of business power and shows how expert policy making can inadvertently force marginalized communities to bear the burden of climate change.

Political scientists often characterize climate change as an abstract issue that—due to the complexity of environmental causes and effects—requires a central role for expertise in policy making (Egan and Mullin 2017). Keohane (2015, 20) distinguishes problems that “arise from every-day experience” from those, like climate change, that require “the public to understand difficult scientific issues.” Yet, for communities that are vulnerable to the effects of climate change, the stakes are acutely material and expert policy making can forestall effective solutions.

In the Yukon-Kuskokwim (Y-K) Delta region of Alaska, the predominantly Yup'ik communities have long relied on salmon for subsistence, and they are now experiencing a collapse of the salmon population. Salmon performs a crucial role in Yup'ik subsistence traditions going back thousands of years and, in a very poor region, it is a central element of many people's diets

(Fienup-Riordan 2020). Residents of the Y-K Delta have vocally demanded increasing restrictions on salmon that commercial fishers are allowed to catch while fishing for pollock (known as “bycatch”) (e.g., Korthuis 2023). However, biologists have provided scientific evidence that rising water temperature—not bycatch—is probably the main cause of the salmon collapse. Citing this evidence, policy makers have rejected increasing bycatch restrictions as costly and likely to be ineffective (O'Hara 2022). As a result, in recent years, pollock fishers have killed hundreds of thousands of salmon in the Bering Sea while subsistence fishing on the Yukon and Kuskokwim rivers has been severely restricted (Herz 2024).

The federal agency setting rules on bycatch in the Bering Sea is the National Marine Fisheries Service—also called NOAA Fisheries due to its location within the National Oceanic and Atmospheric Administration. Its task, defined by statute, is to balance the benefits of restricting bycatch against the costs to commercial fishing. However, while policy may accurately incorporate the

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costs and benefits of restricting bycatch, the result is to insulate the pollock industry from the effects of climate change; the cost is borne instead by Native subsistence fishers. Pollock fishing is a multibillion-dollar industry with an influential lobbying organization (Federman 2023), and research shows that business interests can be a powerful component of climate coalitions (Kennard 2020; Trachtman 2021). The unfortunate irony of a policy based on neutral expertise is that it reduces the likelihood of climate mitigation or adaptation measures that experts suggest could have a significant effect on the salmon population.

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Using a formal model, this article demonstrates how policy making by a neutral expert affects incentives for an industry group to expend costly effort supporting climate policy. The expert is “neutral” in that they weigh the welfare of both subsistence fishers and the industry group when setting bycatch policy. Although the expert nevertheless may favor subsistence fishers over the industry, they have some degree of conflicting preferences with subsistence fishers. This reflects a scenario of expert policy makers neither strongly biased for nor against the people of the Y-K Delta. I compare two hypothetical procedures: either the expert or the subsistence fishers set policy. There are two policy-making periods, which provides an opportunity for the industry group to support a climate policy in the first period to increase the number of fish available in the second period. Subsistence fishers are directly concerned about fish availability, whereas the industry group simply seeks to avoid costs of bycatch restrictions and climate policy.

The model shows that when the expert sets policy, the industry group expends zero effort in support of the climate policy; when subsistence fishers set policy, the industry group expends effort to support the climate policy. The reason for this is that the neutral expert avoids imposing heavy costs on the industry by excessively restricting bycatch. Anticipating limited bycatch restrictions, the industry group has no incentive to support climate policy. By contrast, subsistence fishers always restrict bycatch as salmon declines, shifting the burden onto the industry. This incentivizes the industry

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group to pursue policies to counter the effects of climate change.¹

The model analyzes an unexpected barrier facing marginalized communities forced to navigate the effects of the climate crisis. From the perspective of the Y-K Delta, it is infuriating to have policy demands on a culturally existential issue rejected year after year, and for scientific experts—presumably sympathetic to concerns about climate change—to use those concerns to *reject* demands for policies to ameliorate the effects of climate change. Whereas critics of regulatory capture focus on the danger that

officials respond to wealthy interests rather than utilize expertise, this article analyzes a distinct, structural channel of business power that emerges from the policy-making authority of neutral experts. For climate policies that are both effective and just, vulnerable communities should be empowered to protect themselves from the worst effects of the climate crisis.

EMPIRICAL MOTIVATION

The Y-K Delta encompasses approximately 27,000 people, about 85% of whom are Yup'ik. Residents of the Y-K Delta mostly live in

villages of several hundred people each; Bethel, with a population of about 6,000, serves as a hub community. The federal poverty rate is approximately 25% (i.e., twice the national average), but standard measures fail to fully convey economic conditions in the region.² In the villages, many homes lack running water (Thiessen and Brenner 2023). Prices for consumer goods, including food, are exorbitant due to the fact that the Y-K Delta is not connected to the road system. To meet basic needs, many residents rely on subsistence fishing and hunting—traditional practices that also perform an essential role in Yup'ik culture.

In this context, the collapse of salmon runs on the Yukon and Kuskokwim rivers and subsequent restrictions on subsistence fishing have severe economic and cultural consequences. As a tribal administrator from Hooper Bay explained, “We’re not in it for the money. We are in it to put fish in our freezers for future use. And, you know, that’s a big part of our diet there.” As another Hooper Bay resident said, “It’s like taking away food from our table” (Martinezcuello 2023). In addition to material deprivation, there is a cultural cost. As described by Vivian Korthuis, leader of the regional tribal consortium, restrictions on subsistence mean that “parents and grandparents ... are unable to pass our way of life down to our children and future grandchildren” (Woolsey 2022). Here, climate change threatens the survival of ancient traditions, and it means not having fish in your freezer for the winter.

In response to this crisis, residents of the Y-K Delta have pointed to the Bering Sea pollock fleet. More than half of the US pollock catch comes from the Bering Sea—and, in 2021, Alaska pollock generated \$383 million in revenue (National Oceanic and Atmospheric Administration 2023). Large companies that are invested in the pollock fishery (e.g., Trident Seafoods) also are among the top political contributors in Alaska and lobby extensively on fishing issues (Federman 2023). As one conservation advocate observed, “It seems like what’s occurred over the last

couple of years is you have a pollock fishery and everything has to work around their catch—everything” (Rosen 2023). Trawl pollock fishers use large nets to catch fish, inevitably catching fish other than the targeted species, including salmon. As bycatch, pollock fishers are not allowed to profit from the salmon they catch, and it usually is discarded. Consequently, this salmon is unavailable for subsistence fishing in the Y-K Delta.

The North Pacific Fishery Management Council (NPFMC) provides an avenue for public input regarding fisheries regulations, which ultimately are decided by NOAA Fisheries. For several years, residents of the Y-K Delta have demanded that the NPFMC support bycatch restrictions. The following testimony from Korthuis (2023) is representative of these demands:

The entire burden of conservation for our vulnerable salmon stocks has been placed on our tribal families and subsistence communities—the ones living in areas with the highest cost of living, and the ones with the least amount of economic resources. We are the most highly restricted subsistence fishers in the Nation, while thousands of bycaught salmon are wasted. This is not right. The Council must act now to reduce salmon bycatch by all possible means.

Unfortunately, at that meeting, the NPFMC did not act on these requests by approving a policy to reduce bycatch and, as of September 2024, it still refuses to do so.

In some respects, there are valid reasons to reject the demands from the Y-K Delta. According to an “emerging scientific consensus,” Bering Sea bycatch is not the main cause of the salmon collapse (Rosen 2023). Evidence from genetic studies reveals that most salmon bycatch in the Bering Sea is from Asia, not Alaska (Kim 2021). The Alaska Department of Fish and Game Commissioner Doug Vincent-Lang, a career biologist, argued:

The bottom line is the numbers do not point to bycatch as being the primary driver for the reduced returns. ... Instead, evidence is increasingly pointing to changing ocean conditions related to changing climate conditions.

In addition to this evidence, Commissioner Vincent-Lang cited a duty to sustainably manage the commercial fishery, which would be threatened by excessive bycatch restrictions (O’Hara 2022). These factors—the evidence that climate change rather than bycatch is the primary cause of the salmon decline,

as well as the unnecessary and excessive costs to commercial fishing—are cited as reasons to reject the demands to restrict bycatch.

Although this conclusion may derive from an accurate assessment of biological evidence, it neglects political incentives. A decision against restricting bycatch may be based on neutral expertise yet may limit possible solutions to the climate crisis. By contrast, if residents of the Y-K Delta were to set policy—based not on a neutral weighing of costs and benefits but rather for self-protection against the effects of climate change—this could expand political possibilities for climate solutions.

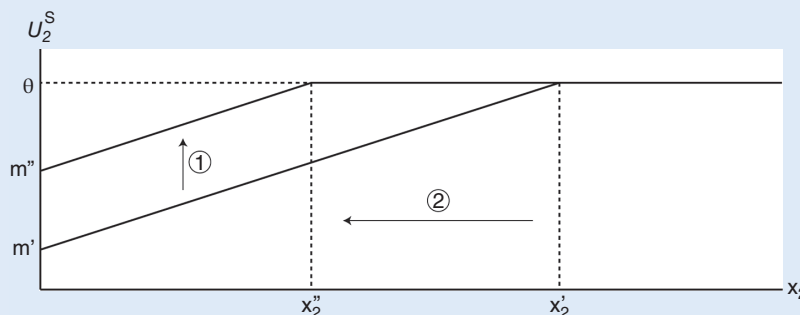
THE MODEL

There are three players in the model: a neutral expert E , subsistence fishers S , and an industry group G . There are two dimensions of policy: bycatch restrictions x_t and a climate mitigation or adaptation policy m . Bycatch restrictions x_t are set in two policy-making periods $t \in \{1, 2\}$ and affect the game in that period, whereas G chooses m in the first period and this choice affects the game in the second period. The timing of policy effects captures the need for players to look ahead to a future in which the effects of climate policies today are realized.

Player S cares about the number of fish available up to a threshold θ , representing the amount of salmon necessary for subsistence. After θ is reached, S ’s utility in x_t stays flat, although I assume that S prefers the lowest level of bycatch restrictions consistent with reaching θ . Subsistence fishers have no reason to prefer excessive restrictions, and there are potential costs (e.g., lower economic benefits to the region). Hence, S does not want the pollock industry shut down entirely; however, any economic benefits are outweighed by subsistence needs. Player S ’s utility in each period t is $x_{t+(t-1)m}$ if $x_t \leq \theta - (t-1)m$ and θ otherwise. Intuitively, S values fish being available up to the threshold θ ; fish availability increases with bycatch restrictions x_t and climate policy m . The choice of x_t affects utility in the current period, whereas m affects utility in the following period. Period 2 utility is discounted by $\delta \in (0, 1)$.

Figure 1 illustrates S ’s utility function and how S ’s utility changes with an increase in m . For S , bycatch restrictions and climate policy are substitutes. Because S values fish up to the subsistence threshold θ and no further, climate policy m affects S ’s subsequent preference over bycatch restrictions x_2 . This is crucial

Figure 1
The Utility Function of S in Period 2



When m increases (1), S ’s induced preference over bycatch rules x_2 decreases (2).

for the incentives in the model, allowing climate policy to diminish *S*'s demand for bycatch restrictions.

Player *G*'s utility is $-\frac{\kappa}{2}x_1^2 - \delta\frac{\kappa}{2}x_2^2 - \frac{\gamma}{2}m^2$. Intuitively, *G* loses utility from any increase in bycatch restrictions, as well as any effort expended on climate policy. Whereas the benefit of bycatch restrictions is linear (i.e., the fewer fish caught by trawlers, the more available for subsistence), the cost is convex, which represents the industry's need for increasingly severe measures to avoid salmon as restrictions increase. Finally, γ represents how costly support for a climate policy is to *G*. This can be interpreted as either a direct cost of adaptation measures (e.g., stocking rivers with salmon); a political cost of supporting mitigation policies (e.g., lobbying or forming a coalition); or an anticipated future cost of such mitigation policies (e.g., higher taxes). I assume that $0 < \gamma < \delta\psi_S/(\theta\psi_G)$, which reduces the number of cases to analyze and works against my argument by making climate policies relatively inexpensive for *G* to pursue.

Player *E*'s utility incorporates the utilities of *S* and *G* arising from bycatch rules in both periods, which represents *E*'s neutrality in setting bycatch policy. In period *t*, if $x_t \leq \theta - (t-1)m$, then *E* receives $\psi_S(x_t + (t-1)m) + \psi_G(-\frac{\kappa}{2}x_t^2)$; otherwise, *E* receives $\psi_S\theta + \psi_G(-\frac{\kappa}{2}x_t^2)$. I interpret ψ_S and ψ_G to correspond to social welfare; thus, *E* accurately weighs the utilities of *S* and *G* from bycatch restrictions. This is how "neutral expertise" is understood in the model. Player *E* does not consider *G*'s cost of supporting climate policy *m* (therefore, we can interpret *G*'s cost of *m* as potentially including lobbying costs), which—if anything—biases *E* toward *S*.

The following assumption sets up the essential tension in the model and corresponds to the substantive case in which climate change is the predominant cause of the salmon collapse in Western Alaska.

Assumption 1: *The cost κ of bycatch restrictions for *G* is large.*

The condition on κ is defined formally in the online appendix. By this assumption, the cost of imposing bycatch restrictions for *G* is high relative to the subsistence benefits for *S*. This reflects the scientific consensus that bycatch restrictions have limited impact on salmon availability but impose substantial costs on commercial fishers.

Solving for a Subgame Perfect Nash Equilibrium, I analyze two alternative policy-making procedures. In the first procedure, *E* sets policy; in the second, *S* sets policy.

Game I: Expert Policy Making

In this case, *E* chooses policy in both periods. The order of moves is as follows:

1. *E* sets policy x_1 .
2. *G* chooses *m*.
3. *E* sets policy x_2 .

In the first period (steps 1–2), the expert *E* sets policy and the industry group *G* chooses a climate policy *m*. Recall that *m* only has a future effect, whereas bycatch restrictions x_t affect the present.

Analysis: In Period 2, for values of $x_2 < \theta - m$, *E*'s utility is $\psi_S(x_2 + m) + \psi_G(-\frac{\kappa}{2}x_2^2)$. Maximizing *E*'s utility with respect to x_2 , we obtain an interior optimum of $\psi_S/(\psi_G\kappa)$. If $\psi_S/(\psi_G\kappa) < \theta - m$, *E*'s utility increases up to this value and then decreases. If $\psi_S/(\psi_G\kappa) \geq \theta - m$, then the constraint binds and *E* chooses $\theta - m$. Hence, *E*'s optimal choice of x_2 is:

$$x_2^* = \min\left\{\frac{\psi_S}{\psi_G\kappa}, \theta - m\right\} \tag{1}$$

Assumption 1 implies that $\theta > \psi_S/(\psi_G\kappa)$. Given this, if *G* selects $m = 0$ in Period 1, then *E* chooses $\psi_S/(\psi_G\kappa)$ in Period 2. In this case, *G* has no reason to select a positive value of *m*. However, if *G* chooses a value of *m* large enough that *E* prefers to select $\theta - m$ in Period 2, then *G* has an interior optimum of $m^\circ = \delta\theta\kappa/(\gamma + \delta\kappa)$. Comparing *G*'s utility in either case, we reach our first result, as follows:

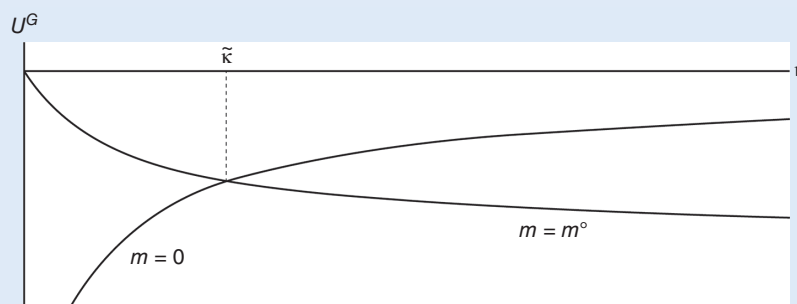
Proposition 1: *When *E* sets policy, *G* always chooses $m^* = 0$.*

Proof: See the online appendix.

Intuitively, this result occurs because the cost of bycatch restrictions for *G* is substantial relative to the benefits for *S* (by Assumption 1), implying that once *E* is making their decision in Period 2—and no prior climate policy has occurred—then *E*'s choice of bycatch restrictions is relatively generous to *G*. Anticipating this, *G* chooses $m = 0$. With this choice, *G* obtains a low level of bycatch restrictions as well as no cost of *m*. Figure 2 illustrates *G*'s utility from choosing $m = 0$ and $m = m^\circ$ given *E*'s anticipated choice of x_2 (recall that the relevant region occurs where κ is large).

This result shows that under expert policy making, the industry group has no incentive to support a climate mitigation or

Figure 2
***G*'s Utility from Alternative Choices of *m* in Period 1**



adaptation policy that could increase the fish available in the future. To emphasize, in the model, the problem is not that the industry group exerts influence on the expert but rather that the expert accurately weighs the costs and benefits of bycatch restrictions across groups when responding to the effects of climate change. The expert might prefer that the industry group support the climate policy in the first period, but the expert faces a commitment problem. Given that no climate policy is implemented in Period 1, the best that the expert can do in Period 2 is to choose bycatch restrictions according to their costs and benefits. Anticipating this, the industry group has no reason to support the climate policy.

Game II: Local Democracy

In this case, S is empowered to choose policy. The order of moves is as follows:

1. S sets policy x_1 .
2. G chooses m .
3. S sets policy x_2 .

The order of moves is almost identical to that of the expert policy-making game except that S chooses policy instead of E .

Analysis: At the end of the game, S chooses $\theta - m$. Notice that the possibility arising in the expert policy-making game, in which E chooses $\psi_S/(\psi_G\kappa)$ for $m = 0$, is eliminated. Therefore, bycatch restrictions in Period 2 *always* depend on prior climate policies selected in Period 1.

In the first period, G 's payoff from a climate policy entails a future benefit and present cost; specifically, G obtains $-\delta^2(\theta - m)^2 - \frac{1}{2}m^2$. Maximizing G 's utility with respect to m , we find that G 's optimal choice is $\delta\theta\kappa/(\gamma + \delta\kappa)$, which is identical to G 's previous interior optimum m^o (i.e., when m is sufficiently large for E to choose $\theta - m$). However, in contrast to the expert policy-making game, G now lacks the option of setting $m = 0$ to achieve a low level of bycatch restrictions. When S chooses policy, the only way for G to reduce bycatch restrictions is through climate mitigation or adaptation measures to address the salmon decline. Hence, we have the following result:

Proposition 2: *When S sets policy, G always chooses $m^* > 0$.*

Proof: In the text.

...when vulnerable communities set policy, they can protect themselves from the costs of climate change. As a result, powerful interests now have “skin in the game” and an incentive to support climate policies to diminish such costs.

The contrast between the first and second propositions encapsulates my core claim: that is, the policy-making procedure alters incentives for the industry group to support climate policy. Because bycatch restrictions and climate mitigation or adaptation measures are independent policy dimensions, when the expert policy maker neutrally weighs costs and benefits of bycatch restrictions, prior climate-policy choices are not considered. By contrast, when subsistence fishers set policy, bycatch restrictions depend on whether the subsistence threshold of fish is met. Hence, the industry supports climate measures when

subsistence fishers set bycatch policy but not when the expert sets bycatch policy.

The incentives analyzed in this article potentially hold broad implications for possible coalitions in favor of climate policy. For example, in a situation with parallels to that of the Y-K Delta, the US Supreme Court recently rejected a claim by the Navajo Nation pursuing rights to water from the Colorado River (Liptak 2023). Like the Bering Sea, the Colorado watershed is a resource utilized by multiple groups, and denying Navajo water rights insulates powerful interests (in this case, large agricultural companies) from the effects of climate change. If, instead, the communities most vulnerable to these effects were to hold the power to set policy on environmental issues that directly affect them, this would alter the incentives of powerful interest groups and expand political possibilities for coalitions to fight the climate crisis.

What form could such empowerment take? There is a range of possible institutions, most notably tribal governments, that could hold greater policy-making authority. In the Western United States, *Winters* rights grant tribes a degree of control over a scarce and necessary resource (i.e., water). Alaska's regional tribal consortia and resource commissions already are deeply engaged in environmental policy, typically through a consultative role with the state and federal agencies that hold decision-making power. The argument in this article indicates the benefits of reversing this relationship for addressing climate change and protecting vulnerable communities.

CONCLUSION

No doubt, scientific expertise is essential to developing climate solutions. Yet, when experts neutrally assess policies to protect vulnerable communities, it can result in those communities bearing the burden of the climate crisis. Because powerful interest groups anticipate that a neutral expert (i.e., one not strongly biased against them) will avoid policies that impose severe economic costs, such groups lack an incentive to support climate mitigation or adaptation measures to address the effects of climate change. However, when vulnerable communities set policy, they can protect themselves from the costs of climate change. As a result, powerful interests now have “skin in the game” and an incentive to support climate policies to diminish such costs.

I conclude by highlighting two implications that depart from prior research. First, in some circumstances, autonomous bureaucrats may undermine effective climate policies (cf. Meckling and Nahm 2018). Second, material redistribution may be a less desirable alternative relative to transferring institutional power (cf. Gaikwad, Genovese, and Tingley 2022). Because the distribution of political power affects potential climate coalitions and, therefore, the prospects of successful climate policy, this is a reason to support a general principle of local democracy for communities that are vulnerable to the effects of the climate crisis.

SUPPLEMENTARY MATERIAL

To view supplementary material for this article, please visit <http://doi.org/10.1017/S1049096524000386>.

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CONFLICTS OF INTEREST

The author declares that there are no ethical issues or conflicts of interest in this research. ■

NOTES

1. We can interpret granting decision-making power to subsistence fishers as an institutional mechanism for guaranteeing a biased policy maker. Understood in this way, the result that there are benefits to biased policy making aligns with prior research in formal theory (Gailmard and Patty 2007; Hübert 2019; Simpson 2023). The specific mechanism, in which bias solves a commitment problem for the neutral expert, is reminiscent of a long-standing perspective on monetary policy (Schnakenberg, Turner, and Uribe-McGuire 2017).
2. The population estimate, percentage Alaska Native, and poverty rate for the Y-K Delta are based on the 2020 US Census, combining the Bethel and Kusilvak census areas (US Census Bureau 2023). Because the Y-K Delta is part of Alaska's Unorganized Borough, there is no county-level unit of government on which to base demographic information.

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