Sink or Swim: Testing the Roles of Science and Religion in Raising Environmental Awareness in Indonesia*

Armand Sim† Sarah Gultom‡ Alyas Widita§ Wang-Sheng Lee¶
Umair Khalil‖

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Abstract

Shifting beliefs and encouraging pro-sustainability behaviors to mitigate climate and environmental issues can be challenging due to their polarizing nature. This challenge is particularly concerning in Jakarta, the world's fastest sinking city, where many residents remain uninformed about land subsidence—its causes, severity, and implications. To understand how to effectively communicate this environmental threat, we conduct a large-scale online experiment that isolates the causal effects of messenger identity and message framing. We vary both the perceived identity of the messenger (portrayed by the same actor as either a religious leader or scientist) and the narrative style of an environmental video message (religious vs. scientific). Our results show that exposure to any version of the environmental message significantly shifts participants' beliefs, enhances both self-efficacy and institutional trust, and increases willingness to adopt pro-sustainability behaviors, suggesting promising pathways for public engagement. The messenger's perceived identity as a scientist—rated as more persuasive and trustworthy than an Imam—generates larger impacts on beliefs regardless of narrative style. A scientist delivering religious narrative is particularly effective at encouraging participants to spread awareness about the root cause of subsidence, while an Imam shows more consistent impact at building trust across stakeholders. The effects on beliefs are more pronounced among individuals with low prior knowledge, high trust in institutions, and less reliance on groundwater for drinking. However, even among those least informed, we find limited evidence of heterogeneous treatment effects on actions. Our findings demonstrate how perceived identity and narrative framing shapes public understanding of and action on environmental challenges.

Keywords: land subsidence, environmental awareness, religion, science, Indonesia
JEL Classification: Q54, Q58, Z12

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*We are grateful to Roes Lutfi and Adrian Chrisnahutama for excellent research assistance. We thank Paul Burke, Rema Hanna, David Park, Yogita Shamdasani, Hyuk Harry Son, and seminar participants at the Australasian Development Economics Workshop, Indonesia Regional Science Association conference, and SDTC conference for comments. Financial support from Monash Business School is gratefully acknowledged. The study is pre-registered on the AEA RCT Registry (AEARCTR-0011525). We received IRB approval from Monash University.

†Centre for Development Economics and Sustainability, Monash University; E-mail: armand.sim@monash.edu
‡Monash University, Indonesia; E-mail: sarah.gultom@monash.edu
§Monash University, Indonesia; E-mail: alyas.widita@monash.edu
¶Centre for Development Economics and Sustainability, Monash University; E-mail: wangslee24@gmail.com
‖Deakin University; E-mail: umair.khalil@deakin.edu.au

1 Introduction

Despite overwhelming scientific evidence of human activities' destructive impacts on climate change (IPCC, 2023), public opinion remains divided on its existence and severity, reflecting ideological differences (Egan and Mullin, 2017), religion-science tensions (Jenkins et al., 2018), misinformation, and resistance to behavioral changes (McLennan, 2024). This polarization hinders effective climate action, particularly in developing countries where limited resources and competing priorities exacerbate the challenge of building necessary public support.[1]

Low-cost, targeted information campaigns can be an effective way for policymakers to promote challenging policies.[2] In the context of climate action, religious and scientific perspectives could play important roles in shaping environmental attitudes. Religious traditions, especially Islam, emphasize pro-sustainability values that can shape environmental perspectives (Dien, 2000; Kula, 2001), and this connection may be particularly relevant in developing countries where religious and local cultural values strongly influence behavior (Bénabou and Tirole, 2016; Nunn, 2019).[3] Similarly, exposure to scientific information and values has also been shown to increase public support for climate action (e.g., Bruine de Bruin and Bostrom, 2013; Motta, 2018). However, the relative effectiveness of information campaigns and moral appeals from religious and scientific sources is not well understood.

In this paper, we examine how messenger identity and narrative style influence environmental message effectiveness by isolating the effect of perceived identity from individual characteristics. Rather than engaging prominent figures whose personal charisma might confound results, we only vary the scientific or religious identity of otherwise unknown messenger. This design

[1] For instance, polarization surrounding climate change has led to major political gridlock in the United States Congress (Dunlap et al., 2016; Egan and Mullin, 2017).

[2] Some examples include endorsement from influential figures can increase vaccination rates (Banerjee et al., 2020; Alatas et al., 2024), while providing information on input quantities (Jessoe and Rapson, 2014), social comparison (Allcott, 2011; Allcott and Rogers, 2014), and moral suasion messages (Ito et al., 2018) can promote energy conservation.

[3] As discussed in Jenkins et al. (2018), many religious authorities have issued formal statements engaging with climate change. In 2015, global Islamic leaders drafted an Islamic Declaration on Climate Change, while in 2015 Pope Francis released the encyclical Laudato Si, highlighting climate change's moral significance in Catholic teaching. This movement also gained momentum in Indonesia, the largest Muslim-majority nation, where the government partnered with the largest Muslim organization to promote environmental conservation activities (Silalahi, 2022).

allows us to investigate two key questions. First, does the perceived identity of messengers exert greater influence than narrative style? Second, can alignment between messenger identity and message content amplify impact? These questions are motivated by recent evidence that both messenger identity and its interaction with content significantly shape audience responses (Afrouzi et al., 2024; Alsan and Eichmeyer, 2024). While understanding these dynamics is crucial for effective communication policy design (Haaland et al., 2023), isolating their effects is challenging. Specifically, messengers may tailor content to audience beliefs, while followers may adopt their thought leaders' stances regardless of content, as suggested by motivated cognition theory (Bénabou and Tirole, 2016).[4]

To address those questions, in collaboration with Qualtrics, we conducted an online experiment with 2,827 participants in the Jakarta metropolitan area between July and August 2023 to investigate the impact of information source identity and narrative style on beliefs and attitudes toward land subsidence, a pressing climate change issue characterized by gradual sinking of the Earth's surface driven by excessive groundwater consumption, population growth, and more frequent droughts (Famiglietti, 2014; McDonald et al., 2014).[5] To assess the relative effectiveness of these factors, we hired an actor to portray both an Imam (a Muslim religious leader) and a scientist to deliver environmental video messages in either a religious or scientific narrative style.[6]

We randomly exposed participants in treatment groups to four video messages: (i) an Imam delivering the environmental message with religious narrative, (ii) an Imam delivering the environmental message with scientific narrative, (iii) a scientist delivering the environmental message with religious narrative, and (iv) a scientist delivering the environmental message with scientific narrative. The control group was exposed to a placebo video about history of Jakarta. Using the same actor to portray both a scientist and an Imam through variation in social markers (e.g., attire

[4] Wang et al. (2023) document evidence of motivated cognition in high-stakes settings. Their study of Chinese Muslim students taking college entrance exams during Ramadan find significantly lower performance compared to peers. However, when exposed to religious guidance from respected clerics permitting delayed fasting, students showed reduced tendency to minimize fasting costs and increased acceptance of postponement.

[5] In the U.S., policies and urban planning often neglect subsidence in coastal areas despite its potential to worsen the impacts of sea-level rise (Ohenhen et al., 2024).

[6] We asked the actor to portray an Imam because Indonesia is predominantly Muslim (more than 80% of Jakarta residents and 67% in our sample).

and greeting styles) allows us to isolate the causal effect of perceived identity or authority from individual characteristics, such as charisma.

Jakarta is suitable for this study because it is the world's fastest sinking city [7] facing significant existential threats, with predictions suggesting that parts of the city could be underwater by 2050, putting its 31 million people and US$ 200 billion economy at risk.[8] Although studies show that further subsidence can be mitigated through policies and actions that reduce groundwater stress (Herrera-García et al., 2021), many Jakarta residents remain largely unaware of the situation and its implications (Takagi et al., 2021). Figure 1 illustrates participants' familiarity with land subsidence and their understanding of groundwater extraction's role. Less than half (47%) of participants reported substantial knowledge about land subsidence, with only 16% describing themselves as extremely knowledgeable. More importantly, only one-third (34.6%) recognized groundwater extraction as a crucial factor contributing to land subsidence.

To evaluate the effectiveness of our treatments, we collected detailed information on five sets of outcomes: beliefs about land subsidence and its primary cause, trust in various stakeholders' capacity to address the issue, self-reported willingness to adopt mitigating actions, support for mitigation policies, and general perceptions of environmental disasters.[9]

We report three main findings. First, we establish that our treatments increase beliefs in both Jakarta's submergence risk and its link to groundwater extraction. This finding demonstrates that information delivery through video messages with appropriate social markers of credibility (attires of scientist and an Imam) can effectively shift environmental beliefs and promote awareness. Second, we find positive effects on self-efficacy and trust in institutions to address the land subsidence issue. Importantly, these effects appear to translate to increased self-reported willingness to take actions to reduce groundwater extraction. Third, interestingly, our findings reveal that the largest positive impacts on beliefs arise when a scientist delivers a religious narrative,

[7] See https://www.bbc.com/news/world-asia-44636934.

[8] The threat of Jakarta sinking is one of the main reasons why the Indonesian government is relocating its capital to Nusantara, a new city planned on Borneo, the world's third-largest island situated 800 miles away (Beech, 2023).

[9] Our experimental design shares similarities with Dechezleprêtre et al. (2022), as both studies utilize informational videos in online surveys. However, while their research examines climate impacts and policies, our intervention addresses a more immediate environmental issue with significant medium-term consequences.

suggesting that the presenter's perceived scientific credibility can amplify the effectiveness of religious narrative, possibly by bridging technical evidence with cultural values. This aligns with our finding that participants consider the scientist portrayal as more convincing than the imam portrayal, regardless of narrative style.

Heterogeneity analysis reveals several interesting insights in how perceived credibility influences different groups. First, the effectiveness of perceived scientific expertise varies with prior knowledge—individuals with high initial knowledge about land subsidence are less responsive when a scientist delivers the message, suggesting that scientific expertise markers may be less influential for those already familiar with the issue. Second, trust in authorities and personal circumstances, such as reliance on bottled water, significantly shape receptiveness to environmental messages. Third, social proximity remains critical when targeting specific religious groups, as demonstrated by Muslim participants' stronger response to messages from the actor portrayal of an Imam. Finally, while increasing awareness is critical for those with limited prior knowledge, we do not find the same impacts on actions, suggesting that information interventions alone may not translate awareness into action.

Overall, our results demonstrate that a low-cost information campaign can effectively shape environmental attitudes through alignment of messenger identity and narrative framing to reach a wider audience. This approach can be valuable for addressing environmental challenges like land subsidence, where the disconnect between immediate actions and long-term consequences often impedes public engagement. This has broader implications for Indonesia, where public opinion remains divided on climate change. The percentage of adults recognizing global warming as a serious problem demanding immediate action only increased from 31% to 36% over the last decade, while 18% deny human responsibility altogether (Bland et al., 2022).[10]

Our study contributes to the broad literature on climate action and environmental communication as well as behavior change in several ways. We contribute to the literature on information intervention design by examining how social markers of different types of credibility or

[10] https://www.theguardian.com/environment/2019/may/07/us-hotbed-climate-change-denial-international-poll.

authority—scientific versus religious—interact with message content to influence environmental beliefs and attitudes in a real-life and high-stakes setting: land subsidence. While prior work has focused on how demographic concordance how demographic concordance (Alsan and Eichmeyer, 2024), celebrity status (Alatas et al., 2024), or expert credentials (Banerjee et al., 2020; Korlyakova, 2021; Wang et al., 2023) affect message reception, relatively less attention has been paid to how different forms of perceived expertise shape message effectiveness. We complement existing research on climate policy framing (e.g., Drews and van den Bergh, 2016; Dechezleprêtre et al., 2022), religious messaging for nature conservation (Buccione, 2023), and information campaign in correcting misperceptions about climate change (Andre et al., 2024). Having the same actor portray both roles which only differs on social markers (attire and greetings) allows us to isolate the causal effect of perceived authority from individual characteristics (e.g., charisma). Our finding that the presenter's identity as a scientist is more influential than narrative style in shifting beliefs suggests that perceived expertise within the relevant domain may outweigh other factors in this dimension.

Second, we contribute to the growing literature on the role of religion in driving behavioral change (Bénabou and Tirole, 2016; Bursztyn et al., 2019; Buccione, 2023) by examining how religious narratives can be effectively incorporated into environmental communication. Our finding that a scientist delivering religious narrative is particularly effective at encouraging information sharing suggests potential complementarities between scientific expertise and cultural resonance. These insights are especially relevant for developing countries where religious institutions play significant roles in shaping public opinion.

Third, we contribute to research on non-pecuniary approaches to energy and resource conservation (Allcott, 2011; Ferraro and Price, 2013; Allcott and Rogers, 2014; Jessoe and Rapson, 2014) by providing insights into effective strategies for promoting environmental behavior change in settings with limited resources and competing priorities. We show how combining different types of perceived expertise with culturally resonant narratives can enhance message effectiveness.

2 Background

2.1 Land Subsidence in Jakarta

Jakarta is the world's fastest-sinking city, with certain areas projected to sink by 5 meters by 2050, exacerbated by 25 cm of sea level rise (Kulp and Strauss, 2019). The primary cause is the over-extraction of groundwater, the city's main water source (Asian Development Bank, 2016; Saputra et al., 2017; Bagheri-Gavkosh et al., 2021). Figure A.1 shows the rate of land subsidence across Jakarta, indicating that northern areas are most vulnerable to its impacts.

To address this issue, the government has implemented various measures, such as lowering piped water subscription fares, expanding polder systems and infiltration wells, as well as restricting groundwater extraction for large buildings (>5,000 square meters, or 8 stories) and households.[11] Despite efforts to promote piped water adoption, groundwater extraction remains prevalent (Taftazani et al., 2022).

While these policies indicate growing attention to land subsidence, efforts to enhance public understanding and awareness about it are surprisingly overlooked. For example, our sample reveals that while 78% of the control group believes land subsidence is a serious problem, only 66% attribute it to human agency via groundwater extraction.

2.2 Islam and the Environment

Islam plays an arguably significant role in shaping the environmental attitudes and behaviors in Indonesia (Sumaktoyo, 2021; Gade, 2015), a predominantly Muslim country (87% self identifying as Muslim). Local religious leaders have contributed to environmental debates through an Islamic lens (Wee, 2024), while prominent Islamic organizations have launched initiatives to promote environmental protection. For example, the Indonesian Council of Ulama (MUI) has issued a fatwa declaring environmental protection a religious duty, while a large Islamic organization Muhammadiyah has launched an initiative (the Eco Bhineka program) to promote environmental

[11] Implemented through Governor's Regulation (*Peraturan Gubernur*) Number 93 of 2021 on Groundwater-Free Zones. See https://peraturan.bpk.go.id/Details/195633/pergub-prov-dki-jakarta-no-93-tahun-2021

protection across faiths.

These efforts draw upon a rich corpus in Islamic teachings, including the Quran (the holy book of Islam) and Hadith (sayings of Muhammad, the prophet of Islam), which emphasize the importance of environmental conservation and earth protection. The Quran contains at least 80 verses on this topic, and the Hadith echoes similar narratives. For example, believers are encouraged towards conservation: "and eat and drink, but be not excessive. Indeed, He likes not those who commit excess" (Quran, 7:31). The importance of planting trees is also emphasized: "If a Muslim plants a tree…and then a bird, or a person, or an animal eats from it, it is regarded as a charitable gift for him [in perpetuity]" (Sahih Bukhari, Vol 3, Book 39, No. 513). Additionally, countless rulings by religious scholars across time and space have established environmental protection and conservation as religious acts for practicing Muslims.

Our approach is motivated by three key aspects of Indonesian society: its large Muslim population, the willingness of local Islamic leaders (Ulama) to engage with environmental issues, and the existence of a significant body of Islamic literature on environmental topics. Together these inform the development of our experimental design by leveraging the role of religious narratives in designing environmental awareness campaigns.

2.3 Trust in scientific evidence and scientists in Indonesia

Despite the critical importance of science in addressing challenges such as climate change, a significant proportion of Indonesians remain skeptical of key scientific findings. In the context of global warming, only 36% of adults view it as urgent, while 18% deny human actions as the main driver of climate change (Bland et al., 2022). This skepticism extends to another controversial issue in public health: COVID-19, with 80% of adults in one of the most hesitant regions in Indonesia, West Java, expressing distrust in vaccines or believing a strong immune system alone provides adequate protection against COVID-19 (KIC, 2021).

Interestingly, while trust in scientific evidence appears low, Indonesians demonstrate high trust in scientific experts, especially those who can communicate complex concepts in culturally relevant ways. Healthcare workers are the most trusted sources for promoting COVID-19 vac-

cination (SMRC, 2021), and research indicates strong public faith in scientists broadly (Cologna et al., 2024). This contrast presents a unique challenge and opportunity. It suggests that while scientific information alone might not be sufficient to drive behavioral change, the credibility of scientific experts could be leveraged to bridge the gap between scientific evidence and public acceptance. This has important implications for how public campaigns to promote awareness and attitudes towards contested issues like climate change and environmental disasters should be designed and implemented in Indonesia.

3 Research Design

3.1 Sampling Frame and Survey Data

Our target population is residents of Jakarta and its surrounding areas—Bogor, Depok, Tangerang, and Bekasi—collectively known as Bodetabek. We focus on Jakarta metropolitan area due to the immediate and indirect impacts of land subsidence. Approximately 1.25 million people from Bodetabek commute to Jakarta daily, accounting for around 11% of Jakarta's population (Statistics Indonesia, 2019), highlighting the economic interdependence between Jakarta and its surrounding areas.

We collected survey data between July and August 2023 from 2,827 adults aged 18 and above residing in the Jakarta metropolitan area. Participants were recruited through Qualtrics, a renowned survey company with an extensive online panel where individuals opt in to receive invitations for surveys. To ensure data quality, we dropped participants that provided straightline answers, exhibited speedy or inconsistent response patterns, and those who reported unable to finish watching the video for technical or other reason. We used a stratified sampling approach to ensure that the samples represent the Indonesian population in terms of gender and age, while also including participants with diverse education, income, and religious backgrounds.

The survey contains several modules that collect information on socio-economic characteristics (e.g., age, income, employment status), neighborhood types (e.g., low and high density),

climate change risk perception, main sources of drinking and non-drinking water, and groundwater usage. In the following subsection, we explain the measurement of our main outcomes.

3.2 Outcomes

We pre-specified the following outcomes in the pre-analysis plan. Each question used to construct outcomes is asked after treatments. We constructed index variables for outcome variables comprising multiple related items (Anderson, 2008). Each index is standardized to have a mean of zero and a standard deviation of one among control group. Detailed variable definitions can be found in Table C.1.

Beliefs. To measure whether the treatments are successful in promoting awareness, we measure participants beliefs regarding the main cause of land subsidence, that is, excessive groundwater extraction. Specifically, we ask the following question with binary response (yes and no): "*In your opinion, do you believe that land subsidence would drive Jakarta completely submerged?*" To measure their beliefs regarding the consequence of land subsidence, we ask the following: "*To what extent do you think groundwater well extraction drives land subsidence in Jakarta?*".

Actions. In addition to promoting awareness, we examine whether treatment effect on awareness translates into action through participants' willingness to adopt self-reported mitigating behaviors. Since our environmental video message identifies excessive groundwater extraction as a key driver of Jakarta's land subsidence, we examine participants' willingness to take action on this issue. Specifically, we ask five (Likert-scale) questions about their likelihood to: reduce water consumption, spread information about the harmful impacts of groundwater extraction, vote for a governor who prioritizes addressing land subsidence, install PDAM (municipal piped water connection), and relocate to gain access to PDAM.

Trust. Building public trust is crucial for addressing polarizing issues, including climate change and environmental issues. To measure trust, we evaluate participants' confidence in different

stakeholders' ability to address land subsidence: individuals (both self and others), businesses, government institutions, religious leaders or groups, and scientists.

Policy support. In addition to collecting information on individual willingness to adopt mitigating behaviors, we collect detailed information on the extent to which individuals support real and hypothetical policy scenarios to mitigate land subsidence impact, some of which were taken from (Asian Development Bank, 2016). We proposed ten policies, including removing the Indonesian capital city status away from Jakarta and imposing restrictions on groundwater use and new wells restriction toward large businesses.

Perception on environmental issues. Environmental and climate change issues remain contentious topics among Indonesia's adult population (Bland et al., 2022). To evaluate our treatments' effectiveness, we assess individuals' perceptions about environmental threats through several measures. First, we examine their perception whether natural disasters and Jakarta's predicted partial submergence by 2050 can be attributed to divine intervention. Second, we examine their trust in science to explain environmental events. Lastly, we also gauge their confidence in preventive efforts to address Jakarta's subsidence crisis.

Concerns on report accuracy. One potential concern in measuring the treatment effects on self-reported outcomes, especially willingness to adopt mitigating actions, trust, and policy support, is that participants might inaccurately report their behaviors to appear more favorable. We address this concern through two approaches. First, we ensure participant anonymity and explicitly communicate that researchers are unable to uncover their individual responses. Second, we use Marlowe-Crowne scale (Crowne and Marlowe, 1960) to measure social desirability bias and test whether it influences participants' reported behaviors.

3.3 Treatments

This study has three goals. First, to test the effectiveness of an informational video message on environmental awareness, attitude, and policy support. Second, to isolate the effects of narrative

type (religious or scientific) and presenter identity (a Muslim religious leader (Imam) or climate change scientist—hereafter referred to as scientist). Third, to identify the most effective combination of presenter identity and narrative type.

To this end, we designed a 2×2 experiment with a control group (see Figure A.2). We cross randomize the presenter identity (Imam vs. scientist) and the narrative (religious vs. scientific) to create four treatment groups. The control group is exposed to a placebo video message. Each treatment group received a 3.5-minute video message, consisting of a 2.5-minute environmental message followed by a 1-minute narrative. The control group received a placebo message of similar duration.

- **Treatment 1 (Imam × Religious):** An Imam presents an environmental message with a religious narrative.
- **Treatment 2 (Imam × Scientific):** An Imam presents an environmental message with a scientific narrative.
- **Treatment 3 (Scientist × Scientific):** A scientist presents an environmental message with a scientific narrative.
- **Treatment 4 (Scientist × Religious):** A scientist presents an environmental message with a religious narrative.
- **Control:** Participants view a placebo video about Jakarta's general history without a presenter.

Intervention details. We hired an actor to appear both as an Imam and a scientist to present each video message. This ensures that subconscious individual-level body language, potentially independent of the actor's role, remains consistent across both treatments. We vary the presenter's identity by altering his appearance and greeting. The Imam wears a white shirt, a short rounded skullcap (*taqiyah* or *kufi*) and a scarf and uses a common Islamic greeting (*Assalamualaikum warahmatullahi wabarakatuh* or *Peace be upon you, and mercy and blessings of*

God). The scientist wears a casual shirt and glasses and uses a secular greeting, free from any religious attributes. To minimize potential biases, we omitted any references or affiliations from the video.[12] The actor delivers a scripted message, which was written in collaboration with a professional copywriter to ensure clarity and effectiveness.[13]

Environmental message. This message provides factual information regarding land subsidence (e.g., concrete statistics on land subsidence, like North Jakarta has fallen 2.5 meters in the last decade) and issues related to groundwater extraction in Jakarta. To help viewers understand the scale of the issue, we also show visual information regarding the causes (e.g., groundwater extraction) and consequences (e.g., flooding and sinking ground) of the land subsidence problem.[14] This approach addresses gaps in knowledge and misconceptions, aligning with guidelines on effective science communication (Bruine de Bruin and Bostrom, 2013).

Narratives. The religious narrative employs Islamic principles and scriptures to promote environmental awareness, highlighting the importance of joint efforts between Muslims and the government in nature preservation. On the other hand, the scientific narrative highlights findings from academic research on land subsidence consequences in Jakarta. These distinct framing strategies allow us to test their relative effectiveness in influencing environmental awareness, as suggested by Bain et al. (2012).

4 Data and Empirical Strategy

4.1 Descriptive Statistics and Balance Tests

Table 1 presents summary statistics and balance test. Our sample consists of 2,827 individuals aged 18 and above, with a slight majority of females and most participants identifying as Muslim.

[12] All videos can be found here.

[13] The scripts for each message and narrative are shown in the Appendix B.

[14] Interventions that provide social consequences of an individual's behavior, such as our informational video experiment, rely on the assumption that people have prosocial preferences and are driven by a desire to help others (Toledo, 2016).

Education levels vary, but more than 50% have either attended or graduated from university. Although about 80% of participants have access to piped water, less than 20 % use it for drinking, suggesting distrust in water quality. Table 1 also shows balance test across treatment groups. For each demographic characteristics, we regress the characteristics on indicators for the treatment groups and calculate the joint significance of these indicators. A lack of joint significance for these treatment indicators indicates successful randomization. Only 2 of 36 tests are significant at the 10% level and 3 at the 5% level. Following Imbens and Rubin (2015), we further verify the balance of our sample by calculating the standardized differences for each covariate across groups. Appendix Table A.1 shows that none of the standardized differences exceed the rule-of-thumb cutoff of 0.25 SD. Overall, these tests indicate that the randomization was successful.[15]

4.2 Empirical Strategy

To test the impacts of exposure to different environmental video messages, each with a different presenter and narrative, we estimate the following straighforward regression specification:

$$\begin{aligned} y_i = \beta_0 + \beta_1 \text{Imam}_i \times \text{Religious}_i + \beta_2 \text{Imam}_i \times \text{Scientific}_i + \\ \beta_3 \text{Scientist}_i \times \text{Religious}_i + \beta_4 \text{Scientist}_i \times \text{Scientific}_i + \mathbf{X}_i' \gamma + \varepsilon_i \end{aligned} \tag{1}$$

where y_i is the outcome of participant i, Imam_i and Scientist_i are indicators for whether a participant was exposed to a video message presented by an Imam or a scientist. Religious_i and Scientific_i are indicators for whether a participant was exposed to a video message with embedded religious or scientific narratives. X_i is a vector of socio-economic control variables shown in Table 1. We do not cluster standard errors, ε_i, because randomization is at the individual level (Abadie et al., 2023).

Each coefficient of interest, β_1, β_2, β_3, and β_4 compares a treatment arm to the control group—participants exposed to a placebo video—representing average treatment effects of exposure to

[15]The randomization exercise was undertaken by Qualtrics itself. Their survey platform has a built-in feature that ensures that participants are randomized correctly across survey arms.

an environment-related informational video with a particular combination of message and messenger. β_1 and β_2 capture the effects of an Imam presenting environmental messages embedded with a religious and a scientific narrative, respectively. Similarly, β_3 and β_4 measure the impacts of a scientist delivering environmental messages with a religious and a scientific narrative, respectively.

We expect exposure to a video message about environmental issues to improve participants' understanding, shape their beliefs, and increase their engagement as well as support for policies addressing land subsidence issues in Jakarta. This expectation is based on the video's detailed information about the causes and consequences of this potential environmental catastrophe and our respondents' relatively low baseline familiarity with the issue—approximately 47 % reported being familiar with it.[16]

Our analysis goes beyond comparing the impact of an environmental video to a placebo. To examine the importance of the presenter's identity, we compare their impact when delivering different narratives. The differential impact of the presenter identity (Imam vs. scientist) when presenting *a religious narrative* is *Religious* $\times$ (*Imam - Scientist*), given by $(\beta_1 - \beta_3)$. Similarly, the effect of the presenter identity when presenting *a scientific narrative* is *Scientific* $\times$ (*Imam - Scientist*), given by $(\beta_2 - \beta_4)$.

To examine the importance of the narrative, we compare its impact when delivered by different presenters. The differential impact of a narrative when presented by *an Imam* is *Imam* $\times$ (*Religious - Scientific*), given by $(\beta_1 - \beta_2)$, while *Scientist* $\times$ (*Religious - Scientific*), given by $(\beta_3 - \beta_4)$, captures the differential impact when presented by *a scientist.* We also evaluate the difference-in-differences estimator (*Imam-Scientist*) $\times$ (*Religious-Scientific*) to isolate the effect of the presenter identity (Imam vs. scientist), independent of the narrative (religion vs. science).

Hypothesis. The cognitive authority theory posits that individuals are more likely to accept information from a source they perceive as an expert (Wilson, 1983). Therefore, we predict that the combination of perceived expertise of the presenter and narrative will have the largest impacts;

[16]About 31 % and 16 % answered "Knowledgeable" and "Extremely knowledgeable".

the Imam's presentation of the religious narrative and the scientist's presentation of the scientific narrative are likely to be the most effective combinations. However, the impacts of the scientist presenting the religious narrative and the Imam presenting the scientific narrative are less predictable. According to this theory, it is hypothesized that these combinations will have smaller impacts compared to the Imam presenting the religious narrative and the scientist presenting the scientific narrative, respectively.

5 Results

5.1 Effects on Environmental Awareness and Belief

Our findings demonstrate that exposure to the environmental video message significantly influences participants' awareness of land subsidence issue in Jakarta, as reported in Table 2. While nearly 80 % of participants in the control group were aware of the Jakarta's submergence risk at the baseline (prior to exposure to video treatment), all treatment arms still manage to further increase awareness and belief of Jakarta's submergence risk and its link to groundwater extraction.

Column 1 shows significant positive impacts on the belief that Jakarta will ultimately be submerged, but the effect varies significantly by messenger identity. The effects are particularly large when the message—either scientific or religious narrative—is delivered by a scientist. The effect is substantially larger when the message is delivered by a scientist compared to an Imam. Treatment 3 (*Scientist* $\times$ *Scientific*) and Treatment 4 (*Scientist* $\times$ *Religion*) have the largest effects—12.2 percentage points (pp) or 15.5 % relative to the control mean and 13.5 pp or 17.2 % relative to the control mean, respectively—nearly twice as large as the effects of the message presented by an Imam (Treatments 1 and 2).

Column 2 reports substantial effects on belief about the role of groundwater extraction in driving land subsidence, with increases ranging from 8.0 to 11.6 pp, or 12-17.5% relative to the control mean, 66.4 %. The scientist's delivery again proves most effective, with scientific and religious narratives increasing beliefs by 11.6 pp (17.5%) and 11.2 pp (16.9%), respectively. These

effects are larger than those achieved when an Imam delivers religious (8.0 pp or 12 %) or scientific narratives (9.6 pp or 14.5 %).

5.2 Effects on Environmental Attitude

Trust. We next turn to examine whether treatments affect participants' trust towards various stakeholders in addressing land subsidence issue in Jakarta. Column 1 of Table 3 reports that the treatments increase trust (index) by 0.09 to 0.15 SD across specifications. This result is most pronounced when an imam delivers a religious narrative (0.151 SD, $p < 0.01$), although it does not differ significantly with other treatments. Table A.2 shows that this increase in trust index is mainly driven by increased trust in individual self-efficacy, governmental institutions, scientific expertise, and religious leadership.

Several patterns emerge from this disaggregated analysis. First, an Imam and a scientist appear to have different effectiveness in bridging the gap between religious and scientific communities. When an Imam delivers either a religious or scientific narrative, trust in scientists increase significantly. However, when a scientist delivers either narrative, participants show no significant increase in trust towards Imams. Second, the effect of an Imam delivering religious narrative has most consistent impacts on trust across stakeholders or institutions, including trust in scientists. On the other hand, a scientist delivering scientific narrative has more targeted effects, showing strong impacts on self-efficacy and trust in scientists, but no spillover effects on trust in other stakeholders, including trust on Imams.

Together, these findings indicate that religious leaders can play an important role in fostering broad-based trust across institutional boundaries, whereas scientists' expertise tends to enhance credibility primarily within their own domain, highlighting the strategic value of engaging religious authority to facilitate public divides and facilitate effective policy implementation in multi-stakeholder contexts.

Action. Having established the positive effects of exposure to video message in building trust, we next examine whether the increased trust translates into behavioral changes. Column 2 of Ta-

ble 3 indicate that the increased trust translates into participants' willingness to adopt mitigating actions, which is consistent with positive impacts on self-efficacy. The action index increases by 0.123 to 0.201 SD across treatments (all $p < 0.05$, q-values < 0.1), with the largest point estimates observed when a scientist delivers a religious narrative (0.201 SD). However, the differential impacts across treatment do not differ from zero.

Table A.3 reports that participants express stronger intentions to reduce water consumption, spread awareness about harmful impacts of groundwater extraction on land subsidence, and connect to municipal water systems (PDAM). A closer examination reveals interesting insights into how the interaction between presenter identity and narrative style can influence different types of behavioral responses. We find that a scientist delivering religious narrative appears particularly effective in promoting water conservation (7.2 pp or 13% relative to control mean) and encouraging information sharing about groundwater impacts. Interestingly, the impact on information sharing exceeds both the impact of the same religious narrative when delivered by an Imam and that of scientific narrative delivered by a scientist (Column 3, Panel B). This suggests that perceived scientific expertise, when coupled with religious narrative, can effectively bridge practical and technical solutions with local values, making environmental messages more persuasive.

We also document differential effectiveness of presenter identity across action types, with a scientist delivering either narrative type has positive impact across high-cost actions (PDAM installation and relocation). In contrast, the effect of an imam is only effective when delivering scientific narrative.

Policy support and perception on environmental threats. Given the positive impacts on trust and willingness to take actions, we expect positive impacts on support for policies to tackle land subsidence issues. However, the evidence indicates weaker support on policy initiatives. Column 3 of Table 3 shows modest and largely insignificant effects on policy support across treatment arms, with only the scientist delivering religious narrative showing marginally significant positive effects (0.092 SD, $p < 0.10$, q=0.109).[17] The limited policy impact likely stems from

[17]Table A.4 shows some support for imposing taxes on groundwater use but the result is not robust to the multiple hypothesis adjustment (sharpened q value > 0.1).

our video message's focus on problem awareness rather than the specific policy solutions. This finding aligns with Dechezleprêtre et al. (2022) who find significant impacts of video messages only when the message explains how climate policies work and its distributional implications. Finally, we do not evidence that our intervention can alter general perception about environmental threat (Column 4) and its index components (Table A.6).

Summary. Our analysis reveals four patterns in environmental video messaging's impact on attitudes and behaviors. First, all treatments increase beliefs about Jakarta's submergence risk and its groundwater connection, with scientist-delivered messages proving most effective. Second, interventions enhance institutional trust in addressing land subsidence, with Imam delivering religious narratives shows the highest (though not statistically different from other treatment arms) impact. Third, this increased trust appears to drive greater willingness to take mitigating actions across treatments, particularly when scientists deliver religious narratives, especially regarding water use and information sharing. Finally, despite positive effects on trust and individual actions, interventions show limited impact on policy support or fundamental environmental threat perceptions.

5.3 Effects on Perception

The results suggest that the presenter's perceived expertise in explaining land subsidence issues may be more influential than the alignment between their identity and narrative style. Figure 2 supports this conclusion. Even though the same actor portrayed both roles, the scientist was considered more persuasive than the Imam when delivering both the religious (p=0.000) and scientific (p=0.025) narratives. Table A.2 suggests that participants' high perceived expertise towards the scientist may be due to their high trust in scientists. Column 7 shows increased trust in scientists across all treatment arms, whereas Column 6 reveals that increased trust in Imams is only observed when participants were exposed to an Imam delivering the message. These findings are consistent with a recent cross-country study that demonstrates high public trust in scientists in Indonesia (Cologna et al., 2024).

On the other hand, the alignment between identity and narrative style appears to be considered slightly more effective for the scientist than the Imam. The scientist is perceived as more convincing when delivering a scientific narrative, although the difference is not statistically significant (p=0.800). We find the opposite pattern for the Imam. Due to data limitations, however, we cannot further explore the reasons for these differences.

5.4 Social Desirability Bias

One concern in studies that measure stated preferences is whether responses accurately reflect true attitudes and behaviors (Epper et al., 2020; Tannenbaum et al., 2022). A credible method to verify this is by asking participants to invest time or money to express their views and measure their correlation with survey responses (Dechezleprêtre et al., 2022). Due to budget concerns, we could not implement this approach. Instead, we used Marlowe-Crowne scale (Crowne and Marlowe, 1960) to assess social desirability bias,[18] particularly for outcomes prone to this bias, such as trust, willingness to act, and support for mitigation policies (Dechezleprêtre et al., 2022). Table A.7 shows that high social desirability score (SDS) has no significant differential impacts on these outcomes, suggesting that while we cannot definitively verify if responses reflect real-world attitudes and behaviors, social desirability bias has minimal impact on our main findings.

5.5 Treatment Effect Heterogeneity

To understand which specific subgroups are most responsive to our intervention, we examine heterogeneous treatment effects by four pre-specified baseline characteristics: knowledge of land subsidence, trust in authorities' ability to address the issue, indicators for main source of drinking water, and for identifying as a Muslim.[19] We focus on two outcome categories with direct policy implications: beliefs about land subsidence and its connection to groundwater extraction, and willingness to take mitigating actions.

The results for each outcome are reported in Panels A, B, and C of Table 4. Panel A shows

[18] Participants in the treatment group, for instance, may have expressed more environmentally friendly views.
[19] For brevity, we omit secondary heterogeneity analyses.

that treatment effect on belief about the severity of land subsidence is significantly weaker among participants with high baseline knowledge (above median)—23.3% of participants reported limited knowledge about the issue.[20] The heterogeneous effects are particularly pronounced when a scientist delivers the message, with interaction coefficients of -0.122 and -0.140 for scientific and religious narratives, respectively.

We also find that exposure to environmental messages has stronger impacts on participants with higher trust levels, though this effect is modest and not consistently significant across treatment arms. However, we find that those who rely on bottled drinking water (67.9% of our sample) responded more positively to the treatments, with effects ranging from 8.7 to 10.2 percentage points across different treatment arms. This suggests that those less dependent on groundwater are more easily convinced by the message. As suggested by the theory of motivated cognition (Bénabou and Tirole, 2016), Muslim participants (69.4% of our sample) responded more strongly to environmental messages delivered by an Imam (9.2 percentage points), highlighting the importance of messenger identity in communication targeting a major religious group.

We document similar patterns in heterogeneous effects on the belief that groundwater extraction contributes to land subsidence (Panel B). The treatment effects are concentrated among participants with low prior knowledge about the issue, with the largest effect observed when the scientific narrative was delivered by a scientist. Consistent positive heterogeneous responses are also observed among those who rely on bottled drinking water, with effects ranging from 7.9 to 10.4 percentage points. Panel C reveals a divergence in the treatment effects on beliefs and actions based on participants' initial knowledge. While the treatment effects on beliefs about the severity of the issue are more pronounced among individuals with low initial knowledge, the willingness to take concrete action is higher among those with greater initial understanding of the problem, though these effects are only marginally significant. This finding suggests that increasing awareness about the severity of the issue is critical for those with limited prior knowledge, but translating this awareness into action may require a different type of intervention.

[20] In our survey, 3.4% reported having no knowledge about land subsidence in Jakarta while 19.90% were slightly knowledgeable.

6 Conclusion

This study experimentally studies the relative importance of the messenger identity and narrative style of an environmental video message in shaping environmental attitudes and behaviors in Jakarta, Indonesia, a city grappling with catastrophic consequences of land subsidence. We find three main results. First, exposure to an environmental video message, compared to a placebo video, shifts environmental beliefs, attitudes, and behaviors. Second, the presenter identity, especially the scientist, plays a more significant role than the narrative style in influencing beliefs about the causes and consequences of land subsidence, trust in the capacity to address the issue, and willingness to take concrete actions to reduce groundwater extraction. The largest impacts arise when a scientist delivers a message embedded with a religious narrative.

Third, our analysis documents heterogeneous treatment effects on individuals' beliefs and actions, underscoring the importance of tailoring communication approaches. Individuals with high initial knowledge are less receptive to updating their beliefs when the message comes from a scientist, while trust in authorities and personal circumstances, such as reliance on bottled water, also shape individuals' responsiveness. Personal experience with environmental issues (e.g., floods) does not seem to matter. The presenter identity is crucial in determining responses from specific religious groups. However, we find limited heterogeneous treatment responses on actions, suggesting that translating awareness into action may require additional measures beyond information interventions.

Our findings offer two important lessons for policies. First, a video message that conveys the urgency and consequences of environmental issues can be a powerful tool for influencing individuals' beliefs and behaviors. Second, the perceived expertise of the presenter may be more important than the alignment between the presenter identity and the narrative style. Policymakers should employ credible scientists and diverse narrative styles to effectively communicate environmental messages across various subgroups, particularly in countries with divided opinions on environmental and climate issues.

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Main Tables and Figures

Table 1: Summary Statistics and Balance Test

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Mean					
	N	C	T1	T2	T3	T4	p-value
Aged 18–24	2,827	0.259	0.253	0.236	0.170	0.239	0.002
Aged 25–34	2,827	0.220	0.163	0.218	0.188	0.203	0.102
Aged 35–44	2,827	0.177	0.240	0.230	0.200	0.210	0.357
Aged 45–64	2,827	0.326	0.330	0.307	0.421	0.329	0.000
Aged 65+	2,827	0.017	0.014	0.009	0.022	0.019	0.236
Female	2,827	0.491	0.534	0.550	0.509	0.539	0.572
College or more	2,827	0.517	0.538	0.560	0.507	0.537	0.362
Employed	2,827	0.840	0.824	0.829	0.850	0.850	0.514
Private sector work	2,827	0.455	0.464	0.462	0.412	0.433	0.224
Main drinking water: piped water	2,827	0.208	0.158	0.164	0.175	0.191	0.486
Installed piped water	2,827	0.828	0.783	0.794	0.814	0.804	0.610
Islam	2,827	0.710	0.715	0.716	0.634	0.698	0.011
Christian Catholic	2,827	0.073	0.066	0.068	0.079	0.076	0.807
Christian Protestant	2,827	0.122	0.122	0.120	0.153	0.125	0.352
Other religion	2,827	0.095	0.097	0.096	0.134	0.101	0.173
Income: $<$ IDR 5 mil.	2,827	0.238	0.222	0.192	0.197	0.191	0.537
Income: IDR 5 - 9.99 mil	2,827	0.354	0.389	0.410	0.412	0.429	0.591
Income: $>$ 10 mil.	2,827	0.408	0.389	0.398	0.392	0.380	0.939
Own current house	2,827	0.764	0.780	0.771	0.726	0.786	0.087
HH size: small(1–2)	2,827	0.132	0.154	0.113	0.132	0.129	0.255
HH size: medium(3–4)	2,827	0.641	0.581	0.625	0.632	0.624	0.287
HH size: big(5+)	2,827	0.227	0.265	0.262	0.236	0.247	0.662
Bekasi, regency	2,827	0.033	0.057	0.051	0.045	0.042	0.678
Bekasi, city	2,827	0.057	0.065	0.061	0.072	0.067	0.899
Bogor, regency	2,827	0.056	0.047	0.056	0.043	0.048	0.805
Bogor, city	2,827	0.036	0.039	0.037	0.047	0.051	0.611
Depok	2,827	0.042	0.048	0.059	0.047	0.067	0.417
West Jakarta	2,827	0.161	0.156	0.168	0.175	0.155	0.777
Central Jakarta	2,827	0.196	0.165	0.157	0.168	0.155	0.931
South Jakarta	2,827	0.116	0.133	0.134	0.137	0.136	0.996
East Jakarta	2,827	0.134	0.138	0.131	0.137	0.127	0.942
North Jakarta	2,827	0.075	0.066	0.063	0.058	0.042	0.261
Tangerang, regency	2,827	0.035	0.032	0.037	0.018	0.034	0.160
Tangerang, city	2,827	0.035	0.025	0.030	0.029	0.030	0.953
South Tangerang, city	2,827	0.024	0.029	0.017	0.023	0.044	0.068
Low density kampung	2,827	0.170	0.190	0.180	0.215	0.189	0.507

Notes: The table reports summary statistics of demographic characteristics. Balance test was conducted by regressing each characteristics on the full set of treatment group indicators. Columns 2 to 6 report mean of baseline covariates—variables constructed from questions asked prior to intervention—of C (Control), T1 (Imam $\times$ Religious), T2 (Imam $\times$ Scientific), T3 (Scientist $\times$ Scientific), and T4 (Scientist $\times$ Religious) groups, respectively. Columns 7 reports p-values of F-tests of joint significance of treatment assignment. Standart errors are robust to heteroskedasticity. * p $<$ 0.10, ** p $<$ 0.05, *** p $<$ 0.01.

Table 2: Effects on Environmental Awareness and Belief

	(1)	(2)
	Belief on land subsidence	Belief on harmful groundwater extraction impact
Panel A		
Imam × Religious	0.079***	0.080***
	(0.022)	(0.014)
	[0.001]	[0.001]
Imam × Scientific	0.075***	0.096***
	(0.022)	(0.014)
	[0.001]	[0.001]
Scientist × Scientific	0.122***	0.116***
	(0.021)	(0.014)
	[0.001]	[0.001]
Scientist × Religious	0.135***	0.112***
	(0.021)	(0.014)
	[0.001]	[0.001]
Panel B		
Imam × (Religious - Scientific)	0.004	−0.016
	(0.020)	(0.013)
Religious × (Imam - Scientist)	−0.056***	−0.032**
	(0.018)	(0.013)
Scientific × (Imam - Scientist)	−0.047**	−0.020
	(0.019)	(0.013)
Scientist × (Religious - Scientific)	0.013	−0.004
	(0.017)	(0.013)
(Imam - Scientist) × (Religious - Scientific)	−0.009	−0.012
	(0.027)	(0.019)
N	2,827	2,827
R^2	0.074	0.137
Control mean	0.786	0.664
Test of equality (p-value)		
Imam × Religious = Imam × Scientific	0.853	0.216
Scientist × Religious = Scientist × Scientific	0.453	0.739

Notes: Dependent variables in column 1-2 are indicators for belief on land subsidence and well extraction impact—measured using Likert scale and is normalized to have response between 0 and 1. All regressions include control variables such as age group, female, college education, employed, private sector work, source drinking water (PDAM), installed PDAM, religion, income level, household size, residence and home ownership, and low density neighborhood. Standard errors are robust to heteroskedasticity. Anderson's Sharpened q-value in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: Effects on Environmental Attitude

	(1)	(2)	(3)	(4)
	Trust index	Action index	Policy support index	Perception index
Panel A				
Imam × Religious	0.151***	0.123**	0.058	−0.018
	(0.054)	(0.055)	(0.054)	(0.058)
	[0.020]	[0.064]	[0.198]	[0.396]
Imam × Scientific	0.103*	0.155***	0.068	0.014
	(0.055)	(0.053)	(0.052)	(0.057)
	[0.100]	[0.016]	[0.185]	[0.396]
Scientist × Scientific	0.117**	0.167***	0.073	0.038
	(0.055)	(0.056)	(0.055)	(0.057)
	[0.073]	[0.016]	[0.185]	[0.344]
Scientist × Religious	0.097*	0.201***	0.092*	0.038
	(0.055)	(0.054)	(0.054)	(0.056)
	[0.109]	[0.001]	[0.109]	[0.344]
Panel B				
Imam × (Religious - Scientific)	0.047	−0.032	−0.010	−0.032
	(0.054)	(0.054)	(0.052)	(0.056)
Religious × (Imam - Scientist)	0.054	−0.078	−0.034	−0.056
	(0.054)	(0.054)	(0.054)	(0.056)
Scientific × (Imam - Scientist)	−0.014	−0.012	−0.005	−0.024
	(0.056)	(0.055)	(0.053)	(0.056)
Scientist × (Religious - Scientific)	−0.021	0.034	0.019	0.000
	(0.055)	(0.056)	(0.055)	(0.055)
(Imam - Scientist) × (Religious - Scientific)	0.068	−0.066	−0.029	−0.032
	(0.078)	(0.077)	(0.075)	(0.079)
N	2,827	2,827	2,827	2,827
R^2	0.175	0.198	0.261	0.069
Control mean	0.000	0.000	0.000	0.000
Test of equality (p-value)				
Imam × Religious = Imam × Scientific	0.383	0.555	0.852	0.570
Scientist × Religious = Scientist × Scientific	0.707	0.539	0.723	0.994

Notes: Dependent variables in column 1-4 are index variables of trust on capacities to address land subsidence issue, willingness to adopt mitigating actions, support various policies, and perception on environmental threats, respectively—constructed using multiple components and standardized with control as the reference group. All regressions include control variables such as age group, female, college education, employed, private sector work, source drinking water (PDAM), installed PDAM, religion, income level, household size, residence and home ownership, and low density neighborhood. Standard errors are robust to heteroskedasticity. Anderson's Sharpened q-value in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

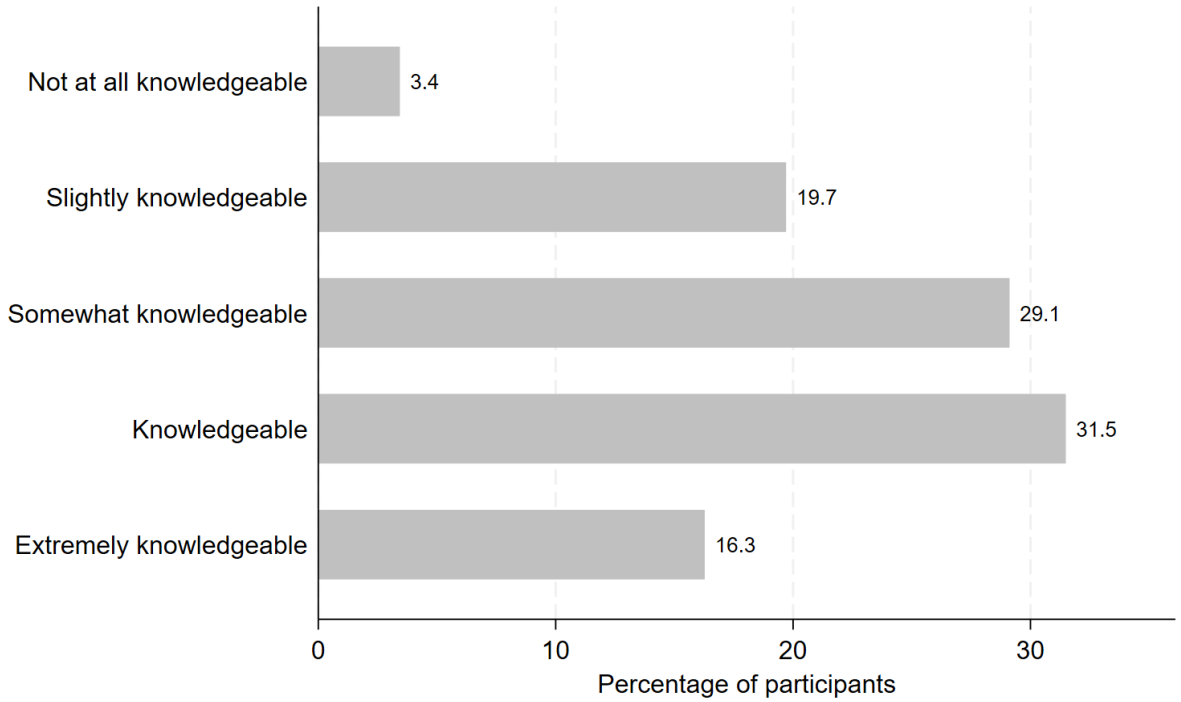
Table 4: Heterogeneous Treatment Effects on Beliefs and Willingness to Adopt Mitigating Actions

	(1)	(2)	(3)	(4)
	Baseline [...]			
	High knowledge	High trust	Rely on bottled water	Islam
Panel A: Belief on existence of land subsidence				
Imam × Religious × [...]	−0.058	0.054	0.036	0.092*
	(0.058)	(0.044)	(0.043)	(0.048)
Imam × Scientific × [...]	−0.098*	0.069	0.087*	0.073
	(0.057)	(0.044)	(0.045)	(0.048)
Scientist × Scientific × [...]	−0.122**	0.041	0.102**	0.032
	(0.056)	(0.042)	(0.042)	(0.044)
Scientist × Religious × [...]	−0.140***	0.057	0.095**	0.042
	(0.052)	(0.041)	(0.041)	(0.043)
Panel B: Belief on impact of groundwater extraction				
Imam × Religious × [...]	−0.089**	−0.009	0.084***	0.029
	(0.035)	(0.027)	(0.030)	(0.030)
Imam × Scientific × [...]	−0.093***	−0.019	0.079***	0.072**
	(0.033)	(0.027)	(0.030)	(0.030)
Scientist × Scientific × [...]	−0.148***	−0.076***	0.081***	0.064**
	(0.035)	(0.027)	(0.029)	(0.029)
Scientist × Religious × [...]	−0.077**	−0.030	0.104***	0.036
	(0.034)	(0.027)	(0.029)	(0.030)
Panel C: Willingness to adopt mitigating actions				
Imam × Religious × [...]	0.236*	0.016	0.070	−0.096
	(0.135)	(0.107)	(0.121)	(0.120)
Imam × Scientific × [...]	0.226*	0.055	0.022	0.027
	(0.131)	(0.103)	(0.121)	(0.121)
Scientist × Scientific × [...]	0.134	−0.030	0.183	0.110
	(0.142)	(0.108)	(0.118)	(0.117)
Scientist × Religious × [...]	0.197	0.184*	0.104	−0.112
	(0.131)	(0.103)	(0.116)	(0.119)
N	2,827	2,827	2,827	2,827

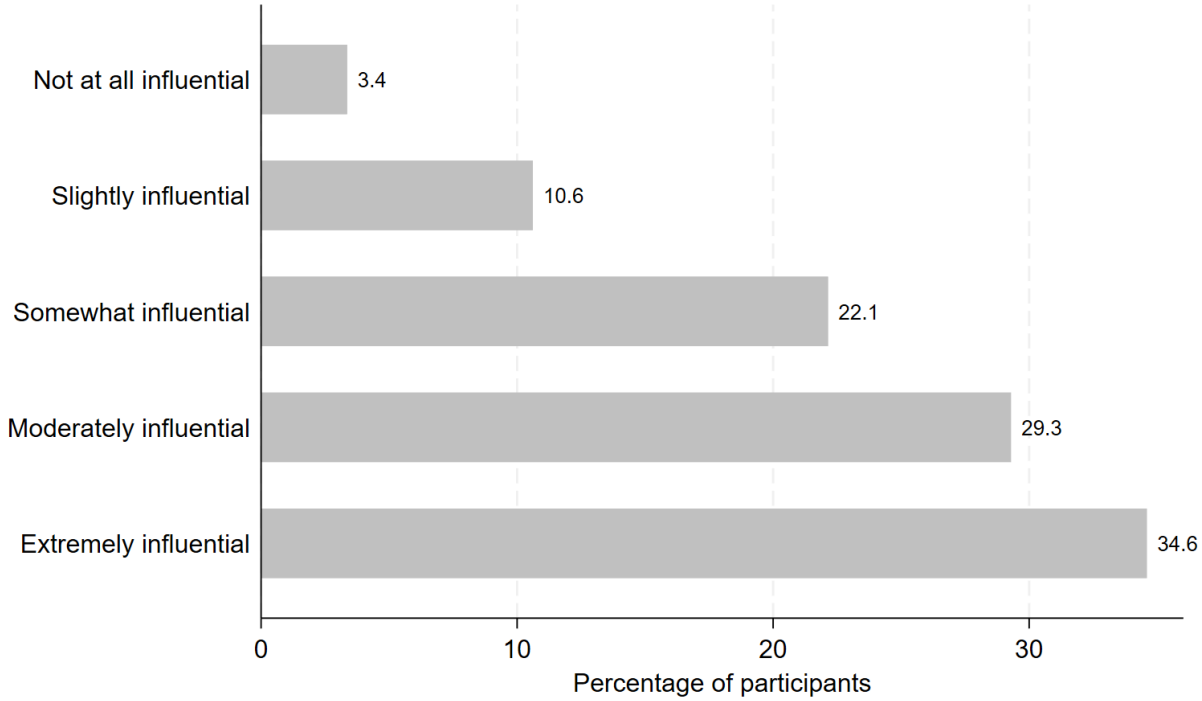
Notes: This table reports heterogeneous effects by high (above median) initial knowledge on land subsidence in Jakarta, high trust (above median) on various stakeholders, indicator for relying on bottled water as the main source for drinking, and indicator for being Islam. Each panel reports separate sets of regressions with different dependent variable. All regressions include control variables such as age group, female, college education, employed, private sector work, source drinking water (PDAM), installed PDAM, religion, income level, household size, residence and home ownership, and low density neighborhood. Standard errors are robust to heteroskedasticity. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure 1: Familiarity with Land Subsidence and Groundwater Extraction as Its Main Cause

(a) Land Subsidence Issue in Jakarta

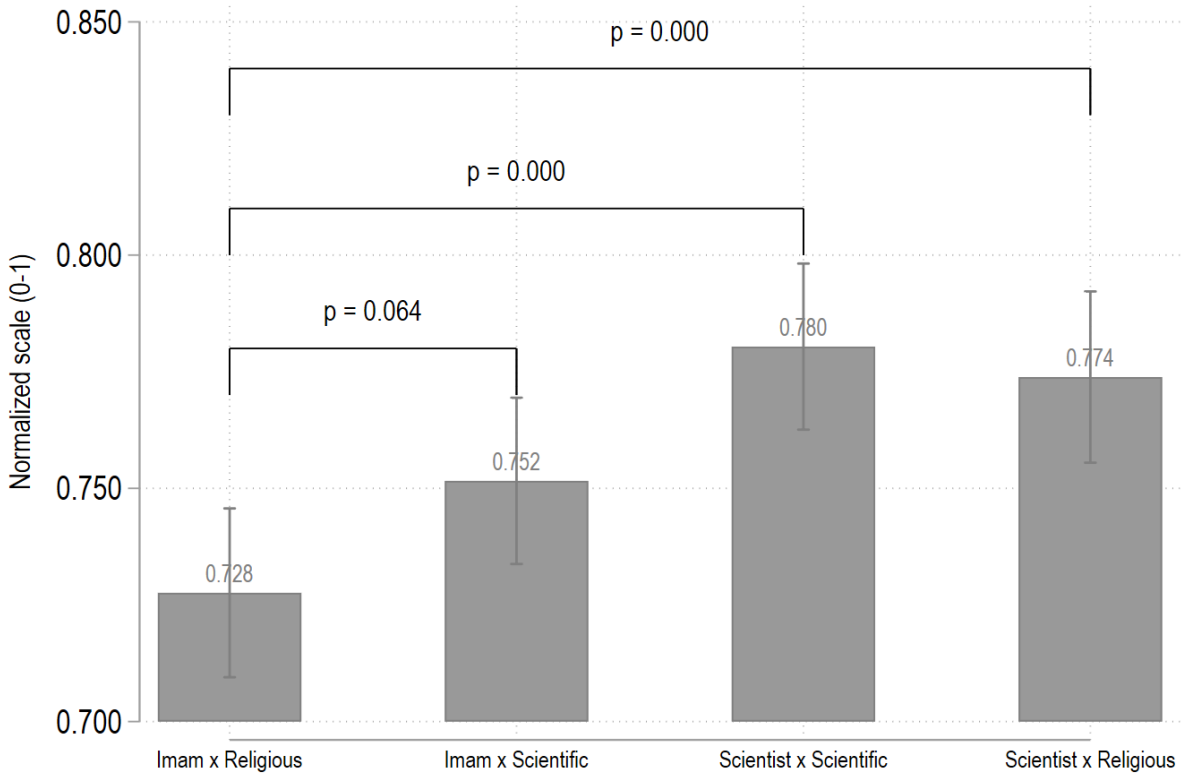


(b) Groundwater Extraction



Note: This figure presents survey responses from 2,827 Jakarta residents. Panel (a) shows respondents' self-reported knowledge about land subsidence in Jakarta, ranging from not at all to extremely knowledgeable. Panel (b) illustrates their perception of groundwater extraction's influence on land subsidence over the past decade, ranging from not at all to extremely influential.

Figure 2: Perceived Persuasiveness Ability of Presenters

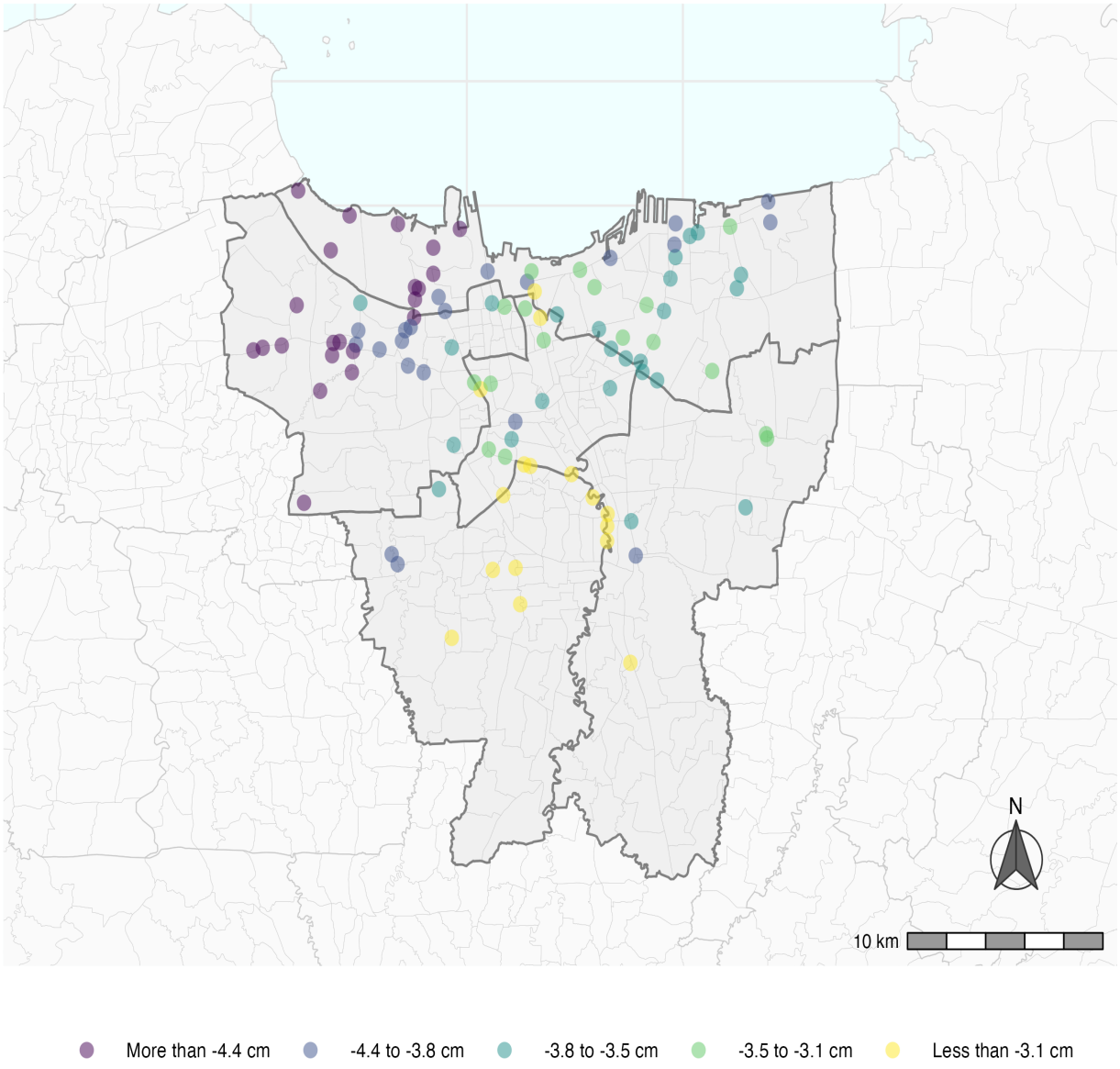


Note: The figure displays the raw mean values and 95% confidence intervals for the persuasiveness ability of presenters delivering an environmental message. The persuasiveness ability is derived from Likert scale responses evaluating how effectively the presenters convey the environmental message and influence opinions on land subsidence. The Likert scale is normalized to have support between 0 and 1. The p-values above the connecting lines indicate statistical significance for mean comparisons between treatment groups: 0.064 for "Imam × Religious" vs. "Imam × Scientific"; 0.000 for "Imam × Religious" vs. "Scientist × Scientific"; 0.000 for "Imam × Religious" vs. "Scientist × Religious"; 0.025 for "Imam × Scientific" vs. "Scientist × Scientific"; 0.087 for "Imam × Scientific" vs. "Scientist × Religious"; and 0.800 for "Scientist × Scientific" vs "Scientist × Religious".

ONLINE APPENDIX

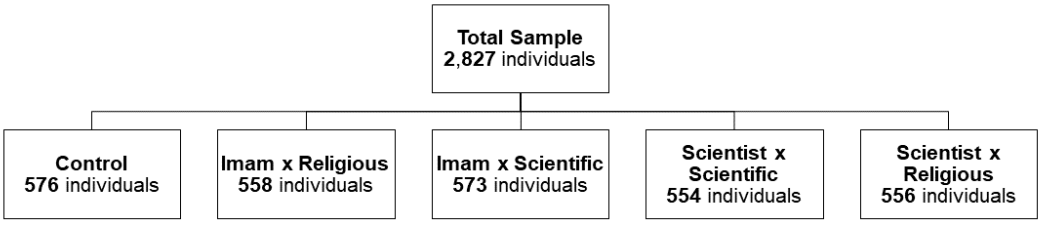
A Additional Figures and Tables

Figure A.1: Land subsidence rate in 2022



Note: This figure depicts land subsidence rate in Jakarta in 2022. Source: Authors' analyses derived from Open Data Jakarta.

Figure A.2: Study Design



Note: The figure shows the design of the experiment. Total sample size is 2,827 individuals distributed into five groups: Treatment 1 (Imam × Religious), Treatment 2 (Imam × Scientific), Treatment 3 (Scientist × Scientific), Treatment 4 (Scientist × Religious), and Control. Participants in Treatment 1 watched an environmental message delivered by an Imam using a religious narrative, while those in Treatment 2 watched an Imam presenting the message with a scientific narrative. Participants in Treatment 3 watched a scientist presenting an environmental message using a scientific narrative, while those in Treatment 4 watched a scientist presenting the message with a religious narrative.

Table A.1: Balance Test: Standardized Mean Difference

	(1)	(2)	(3)	(4)	(5)
		Standardized Mean Difference			
	N	T1 - C	T2 - C	T3 - C	T4 - C
Aged 18–24	2827	0.014	0.053	0.218	0.047
Aged 25–34	2827	0.146	0.006	0.081	0.042
Aged 35–44	2827	0.156	0.132	0.059	0.084
Aged 45–64	2827	0.007	0.041	0.195	0.005
Aged 65+	2827	0.024	0.076	0.031	0.015
Female	2827	0.085	0.117	0.035	0.095
College or more	2827	0.041	0.086	0.020	0.040
Employed	2827	0.043	0.030	0.027	0.026
Private sector work	2827	0.019	0.015	0.087	0.044
Main drinking water: piped water	2827	0.131	0.114	0.084	0.044
Installed piped water	2827	0.114	0.087	0.037	0.063
Islam	2827	0.011	0.012	0.163	0.027
Christian Catholic	2827	0.026	0.019	0.025	0.012
Christian Protestant	2827	0.001	0.003	0.093	0.012
Other religion	2827	0.004	0.002	0.120	0.018
Income: $<$ IDR 5 mil.	2827	0.037	0.112	0.100	0.115
Income: IDR 5 - 9.99 mil	2827	0.072	0.115	0.118	0.154
Income: $>$ 10 mil.	2827	0.039	0.021	0.033	0.058
HH size: small(1–2)	2827	0.063	0.056	0.001	0.009
HH size: medium(3–4)	2827	0.123	0.033	0.018	0.035
HH size: big(5+)	2827	0.088	0.080	0.021	0.047
Bekasi, regency	2827	0.117	0.088	0.063	0.049
Bekasi, city	2827	0.030	0.016	0.061	0.041
Bogor, regency	2827	0.041	0.001	0.056	0.035
Bogor, city	2827	0.016	0.001	0.052	0.072
Depok	2827	0.032	0.081	0.026	0.112
West Jakarta	2827	0.015	0.016	0.036	0.016
Central Jakarta	2827	0.081	0.103	0.073	0.107
South Jakarta	2827	0.049	0.055	0.063	0.059
East Jakarta	2827	0.013	0.008	0.010	0.019
Own current house	2827	0.037	0.018	0.088	0.053
North Jakarta	2827	0.033	0.047	0.068	0.138
Tangerang, regency	2827	0.014	0.010	0.104	0.006
Tangerang, city	2827	0.057	0.029	0.033	0.026
South Tangerang, city	2827	0.027	0.048	0.005	0.109
Low density kampung	2827	0.052	0.025	0.113	0.049

Notes: The table reports standardized difference in mean between each treatment and control group. C (Control), T1 (Imam $\times$ Religion), T2 (Imam $\times$ Science), T3 (Scientist $\times$ Science), and T4 (Scientist $\times$ Religion) groups, respectively. Difference in each covariate between each treatment and control group is considered significant when the magnitude exceeds 0.25 SD (Imbens and Rubin, 2015)

Table A.2: Index Components of Trust in Capacities to Address Land Subsidence Issue

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Trust index	Trust themselves	Trust others	Trust businesses	Trust government	Trust imams	Trust scientists
Panel A							
Imam × Religious	0.151***	0.035**	0.015	0.012	0.044**	0.040**	0.036**
	(0.054)	(0.015)	(0.014)	(0.017)	(0.017)	(0.016)	(0.014)
		[0.040]	[0.251]	[0.353]	[0.031]	[0.034]	[0.040]
Imam × Scientific	0.103*	0.025	0.013	−0.011	0.024	0.042***	0.036**
	(0.055)	(0.015)	(0.014)	(0.017)	(0.017)	(0.016)	(0.014)
		[0.112]	[0.263]	[0.353]	[0.180]	[0.031]	[0.031]
Scientist × Scientific	0.117**	0.048***	0.015	−0.007	0.028	−0.001	0.039***
	(0.055)	(0.015)	(0.014)	(0.017)	(0.018)	(0.016)	(0.014)
		[0.013]	[0.251]	[0.377]	[0.112]	[0.670]	[0.031]
Scientist × Religious	0.097*	0.051***	0.009	−0.025	0.019	0.007	0.035**
	(0.055)	(0.016)	(0.014)	(0.017)	(0.018)	(0.016)	(0.014)
		[0.013]	[0.366]	[0.166]	[0.251]	[0.442]	[0.040]
Panel B							
Imam × (Religious - Scientific)	0.047	0.011	0.002	0.023	0.021	−0.002	0.000
	(0.054)	(0.015)	(0.014)	(0.017)	(0.017)	(0.016)	(0.014)
Religious × (Imam - Scientist)	0.054	−0.015	0.006	0.036**	0.025	0.033**	0.002
	(0.054)	(0.015)	(0.015)	(0.017)	(0.018)	(0.016)	(0.014)
Scientific × (Imam - Scientist)	−0.014	−0.024	−0.002	−0.004	−0.004	0.043***	−0.003
	(0.056)	(0.015)	(0.015)	(0.018)	(0.017)	(0.016)	(0.015)
Scientist × (Religious - Scientific)	−0.021	0.002	−0.006	−0.017	−0.009	0.008	−0.004
	(0.055)	(0.015)	(0.015)	(0.018)	(0.018)	(0.017)	(0.015)
(Imam - Scientist) × (Religious - Scientific)	0.068	0.009	0.008	0.040	0.029	−0.010	0.005
	(0.078)	(0.022)	(0.021)	(0.025)	(0.025)	(0.023)	(0.020)
N	2,827	2,827	2,827	2,827	2,827	2,827	2,827
R^2	0.175	0.163	0.088	0.077	0.078	0.123	0.165
Control mean	0.000	0.601	0.496	0.454	0.499	0.535	0.685
Test of equality (p-value)							
Imam × Religious = Imam × Scientific	0.383	0.478	0.905	0.178	0.228	0.887	0.978
Scientist × Religious = Scientist × Scientific	0.707	0.883	0.674	0.328	0.631	0.644	0.772

Notes: Dependent variable in Column 1 is an index variable that is standardized with control as the reference group. Columns 2-7 present the components of the index variable in Column 1—measured using a Likert scale and normalized to have responses between 0 and 1. All regressions include control variables such as age group, female, college education, employed, private sector work, source drinking water (PDAM), installed PDAM, religion, income level, household size, residence and home ownership, and low density neighborhood. Standard errors are robust to heteroskedasticity. Anderson's Sharpened q-value in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.3: Index Components of Willingness to Adopt Mitigating Actions

	(1)	(2)	(3)	(4)	(5)	(6)
	Action index	Water consumption reduction	Spreading info on harmful groundwater extraction impact	Vote for governor addressing land subsidence	Install PDAM	Relocate for access to PDAM
Panel A						
Imam × Religious	0.123**	0.047***	0.011	0.010	0.018	0.032*
	(0.055)	(0.017)	(0.014)	(0.015)	(0.015)	(0.019)
		[0.016]	[0.269]	[0.281]	[0.144]	[0.105]
Imam × Scientific	0.155***	0.040**	0.029**	0.004	0.039***	0.042**
	(0.053)	(0.017)	(0.014)	(0.015)	(0.015)	(0.019)
		[0.031]	[0.053]	[0.387]	[0.015]	[0.024]
Scientist × Scientific	0.167***	0.049***	0.017	0.002	0.039**	0.059***
	(0.056)	(0.017)	(0.015)	(0.016)	(0.016)	(0.019)
		[0.014]	[0.154]	[0.387]	[0.014]	[0.007]
Scientist × Religious	0.201***	0.072***	0.050***	0.009	0.038**	0.034*
	(0.054)	(0.018)	(0.015)	(0.015)	(0.015)	(0.019)
		[0.001]	[0.007]	[0.281]	[0.015]	[0.072]
Panel B						
Imam × (Religious - Scientific)	−0.032	0.007	−0.018	0.006	−0.021	−0.010
	(0.054)	(0.017)	(0.014)	(0.015)	(0.014)	(0.019)
Religious × (Imam - Scientist)	−0.078	−0.025	−0.040***	0.001	−0.020	−0.003
	(0.054)	(0.017)	(0.014)	(0.015)	(0.015)	(0.019)
Scientific × (Imam - Scientist)	−0.012	−0.009	0.012	0.002	0.000	−0.017
	(0.055)	(0.017)	(0.015)	(0.016)	(0.015)	(0.019)
Scientist × (Religious - Scientific)	0.034	0.022	0.033**	0.006	−0.001	−0.024
	(0.056)	(0.017)	(0.015)	(0.015)	(0.015)	(0.019)
(Imam - Scientist) × (Religious - Scientific)	−0.066	−0.016	−0.051**	−0.000	−0.020	0.014
	(0.077)	(0.024)	(0.021)	(0.021)	(0.021)	(0.027)
N	2,827	2,827	2,827	2,827	2,493	2,493
R^2	0.198	0.100	0.167	0.106	0.118	0.086
Control mean	0.000	0.541	0.693	0.733	0.745	0.612
Test of equality (p-value)						
Imam × Religious = Imam × Scientific	0.555	0.697	0.206	0.689	0.145	0.585
Scientist × Religious = Scientist × Scientific	0.539	0.193	0.029	0.686	0.959	0.196

Notes: Dependent variable in Column 1 is an index variable that is standardized with control as the reference group. Columns 2-6 present the components of the index variable in Column 1—measured using a Likert scale and normalized to have responses between 0 and 1. All regressions include control variables such as age group, female, college education, employed, private sector work, source drinking water (PDAM), installed PDAM, religion, income level, household size, residence and home ownership, and low density neighborhood. Standard errors are robust to heteroskedasticity. Anderson's Sharpened q-value in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.4: Index Components of Support for Policies to Address Land Subsidence Issue (1)

	(1)	(2)	(3)	(4)	(5)	(6)
	Policy support index	Tax ground-water extraction	Restrict households groundwa-ter use	Restrict business groundwa-ter use	Reduce PDAM tariff	Mandate infiltration wells
Panel A						
Imam × Religious	0.058	0.041**	0.019	0.013	0.006	−0.023
	(0.054)	(0.017)	(0.015)	(0.014)	(0.014)	(0.015)
		[0.471]	[0.667]	[0.795]	[0.933]	[0.539]
Imam × Scientific	0.068	0.034**	0.036**	0.012	0.017	−0.008
	(0.052)	(0.017)	(0.014)	(0.014)	(0.014)	(0.014)
		[0.499]	[0.471]	[0.795]	[0.667]	[0.876]
Scientist × Scientific	0.073	0.044**	0.019	0.017	0.017	−0.004
	(0.055)	(0.017)	(0.015)	(0.015)	(0.014)	(0.015)
		[0.471]	[0.549]	[0.549]	[0.539]	[1.000]
Scientist × Religious	0.092*	0.033*	0.029**	0.021	0.012	0.006
	(0.054)	(0.017)	(0.015)	(0.014)	(0.014)	(0.014)
		[0.499]	[0.499]	[0.549]	[0.795]	[0.933]
Panel B						
Imam × (Religious - Scientific)	−0.010	0.007	−0.017	0.000	−0.011	−0.015
	(0.052)	(0.016)	(0.014)	(0.014)	(0.014)	(0.014)
Religious × (Imam - Scientist)	−0.034	0.008	−0.010	−0.008	−0.006	−0.029**
	(0.054)	(0.017)	(0.015)	(0.014)	(0.014)	(0.014)
Scientific × (Imam - Scientist)	−0.005	−0.010	0.017	−0.004	−0.000	−0.004
	(0.053)	(0.017)	(0.015)	(0.014)	(0.014)	(0.014)
Scientist × (Religious - Scientific)	0.019	−0.011	0.010	0.004	−0.005	0.010
	(0.055)	(0.017)	(0.015)	(0.014)	(0.014)	(0.014)
(Imam - Scientist) × (Religious - Scientific)	−0.029	0.018	−0.027	−0.003	−0.006	−0.025
	(0.075)	(0.024)	(0.021)	(0.020)	(0.019)	(0.020)
N	2,827	2,827	2,827	2,827	2,827	2,827
R^2	0.261	0.123	0.159	0.195	0.183	0.189
Control mean	0.000	0.630	0.714	0.783	0.795	0.755
Test of equality (p-value)						
Imam × Religious = Imam × Scientific	0.852	0.662	0.228	0.979	0.424	0.291
Scientist × Religious = Scientist × Scientific	0.723	0.530	0.513	0.791	0.737	0.462

Notes: Dependent variable in Column 1 is an index variable that is standardized with control as the reference group. Columns 2-6 present the components of the index variable in Column 1—measured using a Likert scale and normalized to have responses between 0 and 1. All regressions include control variables such as age group, female, college education, employed, private sector work, source drinking water (PDAM), installed PDAM, religion, income level, household size, residence and home ownership, and low density neighborhood. Standard errors are robust to heteroskedasticity. Anderson's Sharpened q-value in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.5: Index Components of Support for Policies to Address Land Subsidence Issue (2)

	(1)	(2)	(3)	(4)	(5)
	Expand PDAM coverage area	Educate community	Subsidize new PDAM installation	Build sea walls and flood controls	No pushing Jakarta econ growth
Panel A					
Imam × Religious	0.008	0.006	0.004	−0.015	0.019
	(0.013)	(0.013)	(0.014)	(0.014)	(0.015)
	[0.876]	[0.933]	[1.000]	[0.667]	[0.739]
Imam × Scientific	0.011	0.005	0.023*	−0.015	0.008
	(0.013)	(0.013)	(0.014)	(0.014)	(0.016)
	[0.795]	[0.933]	[0.499]	[0.739]	[0.933]
Scientist × Scientific	−0.003	−0.000	0.016	−0.013	0.008
	(0.014)	(0.014)	(0.015)	(0.014)	(0.016)
	[1.000]	[1.000]	[0.549]	[0.876]	[0.876]
Scientist × Religious	0.007	0.026**	0.023	−0.008	0.017
	(0.013)	(0.013)	(0.014)	(0.014)	(0.016)
	[0.876]	[0.499]	[0.539]	[0.876]	[0.770]
Panel B					
Imam × (Religious - Scientific)	−0.003	0.000	−0.019	−0.000	0.010
	(0.013)	(0.013)	(0.014)	(0.014)	(0.015)
Religious × (Imam - Scientist)	0.001	−0.020	−0.019	−0.007	0.002
	(0.013)	(0.013)	(0.014)	(0.014)	(0.015)
Scientific × (Imam - Scientist)	0.014	0.006	0.007	−0.002	0.001
	(0.013)	(0.014)	(0.014)	(0.014)	(0.016)
Scientist × (Religious - Scientific)	0.010	0.026*	0.007	0.005	0.010
	(0.014)	(0.014)	(0.014)	(0.015)	(0.016)
(Imam - Scientist) × (Religious - Scientific)	−0.013	−0.026	−0.026	−0.006	0.001
	(0.019)	(0.019)	(0.020)	(0.020)	(0.022)
N	2,827	2,827	2,827	2,827	2,827
R^2	0.224	0.179	0.174	0.166	0.108
Control mean	0.816	0.804	0.778	0.783	0.685
Test of equality (p-value)					
Imam × Religious = Imam × Scientific	0.809	0.988	0.164	0.972	0.495
Scientist × Religious = Scientist × Scientific	0.474	0.063	0.635	0.725	0.546

Notes: Columns 1-5 present the components of the index variable in Table A.4. in Column 1—measured using a Likert scale and normalized to have responses between 0 and 1. All regressions include control variables such as age group, female, college education, employed, private sector work, source drinking water (PDAM), installed PDAM, religion, income level, household size, residence and home ownership, and low density neighborhood. Standard errors are robust to heteroskedasticity. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Anderson's Sharpened q-value in brackets. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.6: Index Components of Perception of Environmental Threats and Solutions

	(1)	(2)	(3)	(4)
	Perception index	Perception of environmental issues as divine intervention	Perception of scientific explanations for environmental events	Perception of optimism in land subsidence prevention
Panel A				
Imam × Religious	−0.018	−0.005	0.001	−0.003
	(0.058)	(0.017)	(0.013)	(0.014)
		[1.000]	[1.000]	[1.000]
Imam × Scientific	0.014	−0.010	0.013	0.006
	(0.057)	(0.017)	(0.012)	(0.014)
		[1.000]	[1.000]	[1.000]
Scientist × Scientific	0.038	−0.009	0.011	0.018
	(0.057)	(0.017)	(0.013)	(0.014)
		[1.000]	[1.000]	[1.000]
Scientist × Religious	0.038	−0.018	0.023*	0.018
	(0.056)	(0.017)	(0.012)	(0.014)
		[1.000]	[1.000]	[1.000]
Panel B				
Imam × (Religious - Scientific)	−0.032	0.005	−0.012	−0.009
	(0.056)	(0.017)	(0.012)	(0.014)
Religious × (Imam - Scientist)	−0.056	0.013	−0.022*	−0.021
	(0.056)	(0.017)	(0.012)	(0.014)
Scientific × (Imam - Scientist)	−0.024	−0.001	0.001	−0.012
	(0.056)	(0.017)	(0.012)	(0.014)
Scientist × (Religious - Scientific)	0.000	−0.009	0.011	−0.000
	(0.055)	(0.017)	(0.012)	(0.014)
(Imam - Scientist) × (Religious - Scientific)	−0.032	0.013	−0.023	−0.009
	(0.079)	(0.024)	(0.017)	(0.020)
N	2,827	2,827	2,827	2,827
R^2	0.069	0.116	0.200	0.149
Control mean	0.000	0.277	0.804	0.748
Test of equality (p-value)				
Imam × Religious = Imam × Scientific	0.570	0.789	0.327	0.535
Scientist × Religious = Scientist × Scientific	0.994	0.599	0.351	0.998

Notes: Dependent variable in Column 1 is an index variable that is standardized with control as the reference group. Columns 2-4 present the components of the index variable in Column 1—measured using a Likert scale and normalized to have responses between 0 and 1. All regressions include control variables such as age group, female, college education, employed, private sector work, source drinking water (PDAM), installed PDAM, religion, income level, household size, residence and home ownership, and low density neighborhood. Standard errors are robust to heteroskedasticity. Anderson's Sharpened q-value in brackets. * $p < 0.10$, ** $p <$

Table A.7: Social Desirability Bias

	(1)	(2)	(3)
	Trust index	Action index	Policy Support index
Imam × Religious × High SDS	0.042	−0.004	0.042
	(0.108)	(0.109)	(0.109)
Imam × Scientific × High SDS	0.074	−0.141	−0.100
	(0.109)	(0.106)	(0.105)
Scientist × Scientific × High SDS	0.153	0.007	0.037
	(0.110)	(0.111)	(0.110)
Scientist × Religious × High SDS	0.098	0.002	−0.088
	(0.110)	(0.108)	(0.109)
N	2,827	2,827	2,827
R^2	0.186	0.209	0.275
Control mean	0.000	0.000	0.000
Test of equality (p-value)			
Imam × Religious × High SDS = Imam × Science × High SDS	0.769	0.200	0.177
Imam × Religious × High SDS = Scientist × Religion × High SDS	0.612	0.957	0.235
Imam × Scientific × High SDS = Scientist × Scientific × High SDS	0.478	0.177	0.196
Scientist × Religious × High SDS = Scientist × Scientific × High SDS	0.620	0.968	0.256

Notes: This table reports robustness check for social desirability bias. High SDS refers to having a social desirability score that is above median for the sample. Dependent variables in column 1-3 are index variables of trust on capacities to address land subsidence issue, willingness to take concrete actions, and support for mitigating policies, respectively—constructed using multiple components and standardized with control as the reference group. All regressions include control variables such as age group, female, college education, employed, private sector work, source drinking water (PDAM), installed PDAM, religion, income level, household size, residence and home ownership, and low density neighborhood. Standard errors are robust to heteroskedasticity. * p $<$ 0.10, ** p $<$ 0.05, *** p $<$ 0.01.

B Intervention Scripts

The actor read the script for each message and narrative in the Indonesian language. The script is translated into English as follows:

Environmental message *Jakarta is facing a severe issue of land subsidence, where the ground surface is dropping below sea level. Jakarta is the fastest-sinking city in the world. Half of Jakarta's land is already underwater and could sink by another 1 to 15 centimeters every year. This is very concerning because if this continues to happen, by 2050, a quarter of Jakarta could be completely sunk. One clear example is the Wal Adhuna Mosque in North Jakarta; half of it is now underwater. In the last 10 years, North Jakarta has already sunk by 2.5 meters. A small increase in rainfall could immediately lead to floods. This adversely affects the economy and disturbs people's daily activities. Climate change causes an increase in sea level, but do you know the most significant factor causing land subsidence in Jakarta? Excessive soil drilling and groundwater extraction. People in Jakarta are heavily dependent on groundwater for daily needs in residential areas, office buildings, hotels and shopping malls. On average, groundwater contributes 60% to Jakarta's total annual water consumption level. I understand that not all of us have access to cheap and safe PDAM (regional drinking water companies), but we cannot continue using groundwater that is harming the environment. Our government has taken some steps to reduce our dependence on groundwater by improving access to PDAM, providing subsidies and imposing limits on groundwater use.*

Religious narrative *God, may He be praised and exalted, said in Surah Al-A'raf verse 56: "Do not spread corruption in the land after it has been set in order. And call upon Him with hope and fear. Indeed, Allah's mercy is always close to the good-doers." As believers, we are responsible for caring for the Earth that God has given us. Fellow believers have started by working together with the Ministry of Environment and Forestry to spread messages on preserving nature and the environment. I hope that what I talked about today could enlighten all of us about the threat of sinking Jakarta. If God wills, we can save Jakarta together. May God give us success and guidance. Peace be upon you, and mercy and blessings of God.*

Scientific narrative *In a well-known scientific journal, a team of scientists from around the world reported that Indonesia has one of the highest population densities in areas prone to land subsidence. This poses a serious threat to people living in Jakarta. According to the Professor of Meteorology in BRIN (National Research and Innovation Agency), some parts of Jakarta are especially vulnerable to land subsidence because they were originally swamps that have been drained. Coastal flooding could reach 1 meter per second if land subsidence continues at the current rate. Therefore, we must immediately seek preventive measures. I hope what I discussed today could increase our awareness of the threat of sinking Jakarta. We can save Jakarta together.*

C Variable Description

Table C.1: Variable description

Variable	Description
Aged 18-24	Indicator variable for respondents aged between 18 and 24 years old.
Aged 25-34	Indicator variable for respondents aged between 25 and 34 years old.
Aged 35-44	Indicator variable for respondents aged between 35 and 44 years old.
Aged 45-64	Indicator variable for respondents aged between 45 and 64 years old.
Aged 65+	Indicator variable for respondents aged 65 years old and older.
Female	Indicator variable for female.
College or more	Indicator variable for having college or more education status (current or completed).
Employed	Indicator variable for being employed.
Private sector work	Indicator variable for working in private sector.
Main drinking water: piped water	Indicator variable for having piped water as main source of drinking water.
Installed PDAM	Indicator variable for respondents who installed PDAM in their premise.
Islam	Indicator variable for having Islam as religion.
Christian Catholic	Indicator variable for having Christian Catholic as religion.
Christian Protestant	Indicator variable for having Christian Protestant as religion.
Other religion	Indicator variable for having other religion.
Income: $<$ IDR 5 mil.	Indicator variable for having income less than IDR 5 millions.
Income: IDR 5-9.99 mil.	Indicator variable for having income between IDR 5 and 9.99 millions.
Income: $>$ IDR 10 mil.	Indicator variable for having income more than IDR 10 millions.

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Table C.1: Variable description (Continued)

HH size: small(1-2)	Indicator variable for respondent's household member numbers are between 1 and 2.
HH size: medium(3-4)	Indicator variable for respondent's household member numbers are between 3 and 4.
HH size: big(5+)	Indicator variable for respondent's household member numbers are 5 or more.
Own current house	Indicator variable for owning current house.
Bekasi, regency	Indicator variable for respondents who lived in Bekasi regency.
Bekasi, city	Indicator variable for respondents who lived in Bekasi city.
Bogor, regency	Indicator variable for respondents who lived in Bekasi regency.
Bogor, city	Indicator variable for respondents who lived in Bogor regency.
Depok, city	Indicator variable for respondents who lived in Bogor city.
West Jakarta	Indicator variable for respondents who lived in West Jakarta.
Central Jakarta	Indicator variable for respondents who lived in Central Jakarta.
South Jakarta	Indicator variable for respondents who lived in South Jakarta.
East Jakarta	Indicator variable for respondents who lived in East Jakarta.
North Jakarta	Indicator variable for respondents who lived in North Jakarta.
Tangerang, regency	Indicator variable for respondents who lived in Tangerang regency.
Tangerang, city	Indicator variable for respondents who lived in Tangerang city.
South Tangerang, city	Indicator variable for respondents who lived in South Tangerang city.
Low density kampung	Indicator variable for living in a low-density neighborhood.
Outcome	
Primary	

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Table C.1: Variable description (Continued)

Belief on land subsidence	Indicator variable for whether respondent believe that land subsidence would submerged Jakarta.
Belief on harmful groundwater extraction impact	Re-scaled variable (between 0 and 1) from a Likert scale variable where 0 refers to weak belief of impact on groundwater extraction and 4 otherwise.
Trust index	Index variable constructed from responses to questions regarding trust themselves, others, businesses, government, imams, and scientists. These questions are elicited on a 5-point Likert scale, where 0 refers to not confident at all and 4 refers to completely confident. This index is standardized with control as reference group.
Action index	Index variable constructed from responses to questions regarding likelihood of water consumption reduction, spreading info on harmful groundwater extraction impact, vote for governor addresing land subsidence, install PDAM, and relocate for access to PDAM. These questions are elicited on a 5-point Likert scale, where 0 refers to extremely unlikely and 4 refers to extremely likely. This index is standardized with control as reference group.
Policy support index	Index variable constructed from responses to questions regarding favoring of some policy scenarios such as tax groundwater extraction, restrict households and businesses groundwater use, reduce PDAM tariff, mandate infiltration wells, expand PDAM coverage, educate community, subsidize new PDAM installation, build sea walls and flood controls, and restrict Jakarta economic growth. These questions are elicited on a 5-point Likert scale, where 0 refers to strongly oppose and 4 refers to strongly support. This index is standardized with control as reference group.

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Table C.1: Variable description (Continued)

Perception index	Index variable constructed from responses to questions regarding perception on environmental issues as divine intervention, scientific explanations for environmental events, and optimism in land subsidence prevention. These questions are elicited on a 5-point Likert scale, where 0 refers to strongly disagree and 4 refers to strongly agree. This index is standardized with control as reference group.
Robustness	
Social desirability bias score	Variable constructed from various socially desirable answers such as hard to continue work without incentive, feel dissapointed when do not get what they want, given up on something due to underestimated their abilities, felt rebelling against authority even though they were right, always a good listener, take advantage of someone, willing to admit mistakes, retaliate rather than forgive and forget, always polite, never get upset when someone express different ideas, put too much pressure on others, pretending to be sick, and get annoyed by people asking for favors.
Heterogeneous	
High knowledge	Re-scaled variable (between 0 and 1) from a Likert scale variable where 0 refers to not at all knowledgeable and 4 otherwise. This variable is constructed as binary where 0 refers to below median and 1 refers to above median.

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Table C.1: Variable description (Continued)

High trust	Index variable that constructed from responses to questions regarding trustworthy of corporate sectors, municipal and government officials, imams, academic researchers, healthcare workers, and regional and national legislators. These questions are elicited on a 4-point Likert scale, where 0 refers to not trustworthy at all and 3 refers to completely trustworthy. This index variable is standardized with control as reference group then constructed as binary where 0 refers to below median and 1 refers to above median.
High experience with environmental issues	Index variable that constructed from responses to questions regarding experience with environmental issues such as flooding, water shortage, poor air quality, sea-level rise, hot weather/heatwaves, and windstorm. This index variable is standardized with control as reference group then constructed as binary where 0 refers to below median and 1 refers to above median.
Bottled water for drinking	Binary variable whether having bottled water as main drinking water.
Islam	Binary variable whether having Islam as religion.
Female	Binary variable whether the respondents are female.