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Semantic Governance Under Climate Stress: A Situational Grounded Model of Local Agricultural Irrigation Coordination in Taiwan

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Abstract

This study investigates how local governance actors in northern Taiwan navigate agricultural irrigation coordination under intensifying climate-induced water stress. Although conventional water governance models prioritize structural alignment and centralized integration, they frequently prove to be inadequate under conditions marked by institutional ambiguity and semantic volatility. Focusing on the transitional phase between early drought signaling and the formal implementation of water rationing, this research adopts Situational Grounded Theory (SGT) to examine how actors discursively interpret, negotiate, and adapt to evolving hydrological and institutional constraints. Based on unstructured interviews with irrigation officials, farmers, and public administrators, this study traces how expressions such as “under review” and “adjusting regionally” function as semantic instruments for deferral, alignment, and legitimacy building. These phrases are not merely rhetorical fillers; rather, they operate as situated mechanisms through which actors reposition their roles and recalibrate the meanings of governance. Through iterative coding, semantic clustering, and reflexive mapping grounded in SGT, this study develops the LAWFGS (Local Adaptive Water Governance under Flexible Governance Settings) framework. This tri-axial interpretive framework comprises three interrelated dimensions: (1) governance contexts, which captures the hydrological and institutional phase; (2) actor strategy roles, which reflect how actors adopt and shift their discursive positions; and (3) interpretive flexibility, which denotes the degree of semantic maneuvering exercised in response to governance tensions. The LAWFGS framework offers a situated analytical perspective for understanding how coordination is maintained through meaning-making practices under environmental pressure. The framework emphasizes the relational dynamics through which governance unfolds across shifting and often uncertain contexts.

Keywords: semantic governance; adaptive irrigation coordination; LAWFGS framework; drought response; discursive strategies; situational grounded theory



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1. Introduction

As climate change intensifies and hydrological regimes become increasingly volatile, sustainable water governance has become a central concern within global climate adaptation agendas. In Taiwan, this urgency is amplified by sharp seasonal rainfall asymmetries, fragmented catchment structures, and the rising frequency of extreme droughts. These challenges collectively strain the foundations of conventional irrigation systems. In this context, irrigation governance involves more than ensuring water distribution efficiency; it also

implicates the legitimacy of decision making, the interpretive labor undertaken by frontline actors, and the sociopolitical agility required to navigate environmental uncertainty.

This study focuses on a case of drought governance in northern Taiwan, where irrigation restrictions unfold through ambiguous and tiered processes. Although formal mandates are issued centrally, their local implementation is often subject to interpretation, contestation, and strategic delay. Rather than rigidly applying rules, governance actors reinterpret the responsibilities and deploy semantically elastic phrases, such as “subject to field conditions” or “adjusted according to local needs”, to sustain operational continuity amid institutional strain.

While Integrated Water Resources Management (IWRM) has been widely endorsed as a global governance paradigm promoting coordination and integration [1], it has increasingly drawn criticism for its technocratic orientation, assumption of institutional coherence, and limited sensitivity to local complexity. In fragmented and stress-prone contexts, where ambiguity permeates daily governance, IWRM often underperforms in regard to localized adaptations [2–7]. Its rationalist logic tends to obscure the interpretive negotiations, deferred accountabilities, and semantic drift through which governance actually unfolds.

In such uncertain terrains, governance is not enacted through command and control alone, but through discourse and situated interaction. Recent scholarship has underscored the performative function of language in shaping institutional processes [8,9]. Phrases like “flexible allocation” or “under review” are not bureaucratic artifacts, but strategic deferrals that allow actors to postpone decisions, preserve discretion, and maintain legitimacy amid ambiguous mandates. In Taiwan’s rotational irrigation zones, these expressions serve as critical tools for navigating the tension between centralized drought directives and on-the-ground contingencies.

These observations raise critical questions about how governance actors interpret and respond to institutional and hydrological uncertainty. This study addresses three core questions: (RQ1) how governance actors strategically deploy language to manage uncertainty; (RQ2) how actor roles shift semantically in response to changing conditions; and (RQ3) whether a patterned logic underlies the interplay among context, discourse, and role enactment. These questions are situated within the interpretive governance tradition, which emphasizes how institutional actors make sense of shifting mandates through narrative framing, symbolic negotiation, and micro-political improvisation [10], offering a lens to understand how discursive practices shape adaptive action under uncertainty.

To address these questions, this study adopts the framework of Situational Grounded Theory (SGT) [11,12], which treats governance not as a stable apparatus, but as a contextually emergent phenomenon. SGT foregrounds the iterative interplay between meaning making, actor positioning, and situated action. These elements are particularly relevant in regard to Taiwan’s plural irrigation regime, where agricultural and industrial users often compete for overlapping water claims, and no single agency possesses unilateral authority. Through this lens, governance is not understood as the mere enforcement of rules; rather, it unfolds as the performance of semantic calibration under tension, mediated by shifting social alignments and ecological risks.

This inquiry is situated in northern Taiwan, a region experiencing increasing hydroclimatic volatility and layered governance tensions. Despite having formal water allocation rules, frontline irrigation officials are routinely confronted with drought thresholds that are not just hydrological but political. Central authorities may issue general directives, but local actors, especially those managing second-stage irrigation or balancing agricultural and industrial needs, must interpret these directives within ambiguous and fast-changing field conditions. The decision to suspend irrigation for certain crops, delay fallow an-

nouncements, or reclassify usage categories often unfolds through subtle linguistic shifts, backstage negotiations, and discursive buffering.

These dynamics are further complicated by Taiwan's semi-centralized governance architecture, where overlapping jurisdictions and unclear responsibility demarcations blur the boundary between compliance and improvisation [13]. Unlike integrated models that presume role clarity and incentive alignment, Taiwan's irrigation governance operates through provisional alignments, semantic buffering, and negotiated pacing. It is precisely in this interstitial space, where signals are partial, rules negotiable, and authority contingent, that strategic ambiguity finds fertile ground.

Against this backdrop, this study contributes to a growing body of scholarship that treats ambiguity not as failure, but as a constitutive feature of adaptive governance [14]. Rather than aiming to eliminate semantic plurality, effective governance may rely on actors' ability to work with it: to mobilize linguistic elasticity, recalibrate institutional meanings, and choreograph action in alignment with environmental shifts. This theoretical orientation calls for an integrative framework that draws together insights from interpretive policy analysis, discursive institutionalism, and contextual organizational theory.

Empirically, this study offers a fine-grained account of how language becomes a technology of governance in water-scarce contexts. By examining how actors modulate policy meanings in situ, it illuminates a subtler repertoire of governance tools. These tools are grounded not in compliance metrics, but in the strategic mobilization of ambiguity, pacing, and semantic maneuvering. Rather than being anomalies, they constitute the everyday "governance grammar" through which institutional life is sustained by dynamic ecological regimes.

To investigate these dynamics, this study inductively reconstructs meaning configurations from situated interactions, tracing how actors interpret and adapt in regard to evolving hydrological and institutional landscapes. Through unstructured interviews with farmers, irrigation officials, policy intermediaries, and local administrators, the research unpacks the micro-semantics of governance: how meanings are coproduced, how roles are rhetorically adjusted, and how ambiguity becomes a tool for navigating environmental and political volatility.

The remainder of this paper is structured as follows. The next section outlines the methodological design, detailing the application of SGT and the interpretive coding procedures used. This is followed by the results section, which presents the empirical findings, including the construction of semantic categories, the identification of eight governance configurations, and the development of the LAWFGS tri-axial framework. The discussion section contextualizes these findings by emphasizing the framework's relevance for analyzing semantic negotiations, elaborating on its theoretical contributions, and assessing its applicability within agricultural irrigation governance. Finally, the conclusion addresses the research questions, summarizes the key insights, and discusses the study's limitations and potential directions for future research.

2. Materials and Methods

2.1. Research Design and Data Sources

To address the disconnect between abstract models of water governance and the complex realities of local implementation, this study adopts a qualitative, interpretive design. At its methodological core lies SGT, a flexible yet rigorous framework for capturing the interplay of discourse, perception, and institutional action.

Rather than offering a generalized account of stable governance, the analysis centers on a specific temporal arc: the progression from normal water conditions to official rationing.

This focus provides a situated lens through which to examine how governance actors recalibrate language, roles, and strategies in response to intensifying stress.

Drawing on unstructured interviews with farmers, irrigation officials, consultants, and administrators, this study traces how meaning is constructed and enacted under escalating pressure. SGT facilitates an inductive approach, allowing categories to emerge from within contingent contexts and discursive practices.

The empirical focus is northern Taiwan's agricultural water regime during 2021–2023, a period marked by droughts, rationing, and contested narratives. (In 2021, Taiwan experienced its most severe drought in half a century, leading to a sharp decline in reservoir storage levels. In 2022, the drought was partially alleviated by the plum rain season and typhoons, although localized water shortages persisted. In 2023, a spring drought was followed by intense summer downpours, reflecting a rapid shift between drought and flood conditions.) Twelve informants were selected across different governance levels (see Appendix A Table A1 for participants' information). Without rigid protocols, the interviews elicited discursive shifts, and performative responses were otherwise obscured.

Data were drawn from three sources: interview transcripts, institutional documents (e.g., water plans, technical records), and other materials (e.g., news reports and meeting notes). These sources were analyzed using a triangulated logic that interweaved sectoral views, discursive patterns, and hydrological temporality. This approach reconstructs governance as a mediated process, wherein meaning is continually negotiated across different roles and contexts.

2.2. Interpretive Grounding and Mapping as Theorizing: Applying SGT to Semantic Governance Construction

This study employs Situational Grounded Theory (SGT) as its methodological framework, building on Clarke's post-positivist revision of grounded theory that emphasizes the situated nature of meaning making, discursive multiplicity, and the embeddedness of power and non-human elements in shaping social processes [11,12]. Rather than imposing linear coding hierarchies or pursuing a singular core category, SGT privileges interpretive grounding and mapping as theorizing, enabling theoretical insights to emerge through dynamic visual and semantic associations across heterogeneous data.

Following SGT's emphasis on horizontal analysis over axial abstraction, these codes were not categorized into typological trees, but were instead clustered into semantically resonant groupings, which we refer to as semantic clusters. These clusters reflect recurring discursive logic, such as hydrological sensing, temporal framing, semantic delay, role realignment, role ambiguity, and semantic rearticulation. Each cluster was then visually and analytically linked to two emergent interpretive dimensions (for the detailed definitions see Section 3.2):

1. Actor strategy role, which captures how actors position themselves in the governance field (e.g., observers, translators, negotiators, reframers);
2. Interpretive flexibility, which describes the degree and nature of semantic maneuvering (e.g., conservative framing, strategic ambiguity, discursive adjustment, narrative reframing).

This analytical arrangement is synthesized in Appendix A Table A2, which traces how specific initial codes, grounded in raw data, are interpreted through semantic clustering and then mapped along the two interpretive axes.

Rather than serving as transitional steps toward a core category, these interpretive dimensions themselves function as axes of a semantic field, allowing us to visually and conceptually locate actor discourses along the interaction between role orientation and discursive strategy. This two-dimensional governance semantic field does not represent

a typology, but a situated plane of possible configurations, reflecting how governance meaning is both contested and adaptive under pressure.

Building on this field, we identified eight patterned configurations that recur across different water governance phases. These configurations emerged not through fixed coding sequences, but through recursive relational comparisons, by tracking how specific actors recalibrate their semantic strategies in response to institutional ambiguity and hydrological signals. For instance, a translator employing strategic ambiguity during the early warning phase is analytically distinct from a reframer deploying narrative reframing under rationed conditions.

By engaging with hydrological phases (e.g., normal, moderately tight, severe, and rationed) as situational governance contexts, and by integrating interpretive flexibility with actor strategy roles, these eight configurations were synthesized into a tri-axial mapping framework. This framework constitutes the core of the LAWFGS (Local Adaptive Water Governance under Flexible Governance Settings) framework, which brings together semantic positioning, actor agency, and environmental contingency into a generative analytical structure.

Throughout this process, MAXQDA (version 24.5) was employed to manage coding traceability, memo linkage, and matrix visualization. However, the model's architecture was not derived from software logic, but from close reading, situational comparisons, and interpretive abstraction, consistent with SGT's methodological ethos.

This mapping-centered analytical path enabled us to theorize governance not as an institutional blueprint, but as a semantic terrain, whereby actors navigate uncertainty through context-sensitive discursive maneuvering. The LAWFGS framework, thus, reflects not just empirical patterning, but the situated enactment of the meaning of governance under adaptive stress.

2.3. Interpreting Hydrological Contexts and Strategic Responses

This study is centered on how actors in local water governance interpret escalating hydrological stress and respond through strategic discourse. To frame this process analytically, four interpretive water scenarios were identified: normal, moderately strained, critically scarce, and officially rationed. These stages are not defined solely by hydrological metrics, such as reservoir levels. Rather, they emerge through the interplay of policy announcements, irrigation plans, collective perceptions, and actor negotiations. They reflect how governance participants assess and reframe the severity of water conditions in place-based settings.

Each stage is accompanied by a characteristic semantic register and corresponding strategic orientation (see Table 1). During moderate strain, actors frequently employ ambiguous phrases such as “depending on conditions” or “under internal discussion” to delay firm decisions and retain maneuvering room. In regard to more critical stages, such as rationing, narrative framings shift toward appeals grounded in past hardship or shared sacrifice, mobilizing urgency and legitimacy.

These responses do not follow a uniform logic. The same hydrological condition may trigger divergent strategies depending on the actor's institutional role, past interactions, or organizational identity. Rather than a linear response system, local water governance functions as a dynamic field of interpretive work. Actors engage in meaning making, recalibrate roles, and modulate strategies based on evolving signals and constraints. This interpretive variability underscores the suitability of the SGT approach, which privileges situated reasoning over fixed rule following, and aligns with our aim to trace meaning construction under institutional ambiguity.

Table 1. Hydrological phases and corresponding strategic response logic.

Hydrological Phase	Contextual Features	Strategic Response Logic
Normal	Stable policy, regular irrigation, routine communication	Risk monitoring, mental preparedness, reserved rhetoric
Moderately Tight	Emerging water restriction discourse, increased media signals	Internal coordination, strategic vagueness, tempo adjustment
Severe	Official alerts, district-level rationing	Policy negotiation, invocation of precedent, responsibility shifting
Rationed	Implementation of restrictions, rotational irrigation, compensation	Role transformation, legitimacy framing, resource mobilization

Note: Table 1 summarizes the observed correspondence between each hydrological phase and the typical strategic responses adopted by actors. These classifications are grounded in empirical evidence from interview data and informed by localized adaptations of context-embedded governance theory [10].

2.4. Research Trustworthiness, Validity, and Ethical Considerations

As a qualitative inquiry grounded in SGT, this study evaluates research rigor through conceptual saturation, coding coherence, and interpretive transparency. This approach aligns with the qualitative standards proposed by Charmaz and Nowell [15,16].

Empirical data were drawn from twelve in-depth interviews conducted in northern Taiwan, representing diverse stakeholders, including government agencies, irrigation associations, agribusinesses, and technical advisors. Policy documents and official irrigation schedules were also reviewed to support data triangulation. Interviews continued until no new conceptual themes emerged, indicating saturation.

Analytical procedures emphasized consistency and contextual fidelity. Coding was conducted iteratively, applying constant comparative methods and cross-role analyses to ensure semantic coherence. Selected transcripts were independently coded by a second analyst to reduce interpretive bias and support and refine the interpretive emergence of the categories. This process enhanced the relational robustness and interpretive grounding of the model.

Documentation of the analytical decisions, model refinement, and theoretical sensitivity was maintained throughout. Representative data excerpts are presented in Section 4.3 to illustrate the empirical basis of the theoretical claims.

In this study, ethical protocols were rigorously followed. Participants provided their informed consent and were fully briefed on data use and their withdrawal rights. All identifying information was anonymized, and care was taken to preserve the contextual meaning in the presentation of potentially sensitive narratives.

2.5. Reflexive Methodological Considerations

This study did not begin with the intention of modifying or extending grounded theory methodologies. However, through the empirical process of navigating multi-actor field data and semantically volatile governance narratives, it became clear that conventional case-based coding frames were insufficient for capturing the layered interpretive, strategic, and institutional complexities embedded in local water governance. SGT offered a productive entry point, not for its coding procedures alone, but for its orientation toward mapping discursive and situational flows.

The decision to develop a tri-axial interpretive structure emerged inductively, not from pre-imposed categories, but from repeated encounters with tensions between role expectations, semantic ambiguity, and shifting water conditions. Early in the analysis,

coding inconsistencies across actor groups prompted a shift from role-type labeling to strategy-based categorization. This change allowed more granular attention to be placed on how similar roles performed divergent functions across hydrological phases.

Moreover, the act of constructing configuration maps and semantic field models required a departure from rigid proceduralism. Instead, reflexive iteration between data, diagrams, and interpretive memos was adopted. This flexibility, while methodologically unorthodox, enabled the analysis to remain responsive to emergent properties in the data, particularly the relational repositioning of meaning, legitimacy, and action under ecological stress.

This reflexive journey underscores that methodological fidelity should not equate to rigidity. Rather, it affirms that grounded theory, especially in its situational form, can be generative when used not as a blueprint but as a context-sensitive analytic approach. The resultant LAWFGS model is, thus, not only an analytical outcome, but also a methodological artifact shaped by the epistemic demands of the field. Future applications in similarly ambiguous or contested governance arenas may benefit from this approach, particularly where the interplay of discourse, roles, and context resists linear modeling or deductive theorization.

3. Results

3.1. Hydrological Phases and the Semantic Reconfiguration of Governance Contexts

In regard to Taiwan's agricultural water governance, hydrological changes serve not only as operational triggers, but also as discursive events through which actors interpret risk, reposition roles, and recalibrate strategies. Rather than treating water availability as a purely physical phenomenon, this study identifies four contextual stages derived from both interview data and the Taiwan Water Resources Agency's alert framework. These stages, including normal, moderately tight, severe, and rationed, function as semantic markers, guiding actor interpretation and the governance response.

Under normal conditions, the language of actors centers on routine planning and latent preparedness. Farmers often rely on experiential heuristics and upstream monitoring, as one respondent (PA1) noted, *"We monitor the reservoir levels. . . and get a sense of whether this year will be difficult."* Such expressions reflect not only early risk perception, but also the restrained use of language to maintain communal calm.

As conditions shift to a moderately tight phase, precautionary discourse intensifies, even in the absence of official restrictions. Strategic ambiguity becomes a shared discursive strategy. A senior advisor (PA4) stated, *"We all know it's time to save water, but we still wait for formal announcements."* In regard to this liminal zone, actors begin internally rehearsing their future roles, using semantic delay as a governance tactic, while negotiating uncertainty.

When the situation reaches the severe stage, anticipatory action and institutional anxiety emerge. A respondent (PA3) from the technology sector reported, *"activating water-saving protocols ahead of official measures, anticipating escalation."* Actors draw upon shared memory and historical references, expressing concern through indirect critique and collective recollection. Discursively, this phase marks a transition from ambiguity to strategic mobilization.

In regard to the rationed stage, irrigation rotations and formal restrictions restructure actor relationships. New roles surface, often informally assigned, such as elder farmers coordinating allocations or cooperative leaders mediating tensions. One farmer (PA1) noted, *"Now we rotate weekly. . . older farmers help coordinate to make it fair."* This stage makes visible the discursive contestation over legitimacy and the adaptive reorganization of governance roles.

These four stages do more than trace a sequence of water availability. They map a continuum of semantic and strategic transformations that underpin local governance. As vocabularies shift, roles are recalibrated, and responses enacted, what emerges is not merely an adaptive system, but a narratively constructed space of governance. It is precisely this dynamic discursive terrain that grounds this study's articulation of a tri-axial semantic governance field. This field is situated at the intersection of contextual variability, strategic language, and role modulation.

While the four stable stages provide a backbone for semantic governance patterns, they do not fully account for the nuanced shifts that occur between them. Beyond these four stable stages, empirical patterns revealed transitional passages that not only reflect shifts in water availability, but also signal evolving expectations, actor sensitivities, and discursive recalibrations. Our inductive analysis identified four such transitional patterns. Three of these align with progressive movements along the hydrological continuum, as follows:

1. From normal to moderately tight, wherein anticipatory ambiguity begins. As stated by PA12, *"Once upstream storage shows signs of stress, we usually call a meeting to remind the farmers to stay alert. Even if no official order comes yet, people can sense that things are changing."*
2. From moderately tight to severe, the sense of institutional urgency becomes more pronounced, prompting earlier coordination efforts among actors. One actor (PA3) shared, *"When anticipating water scarcity, we activated water-saving protocols ahead of official measures, anticipating escalation."*
3. From severe to rationed, actors begin to reconfigure coordination mechanisms in response to formal restrictions. As one actor (PA2) noted, *"Each group would be informed when to irrigate, if someone doesn't follow, they'll be reminded."*

A fourth configuration suggests a post-rationing phase in which hydrological conditions may improve unevenly or remain ambiguous, yet institutional communication does not fully reset. This liminal state reflects not a return to normalcy, but a prolonged tension wherein actors struggle to interpret whether the crisis has truly passed. It is during this extended phase of uncertain recovery that governance recalibration becomes the most fragile. This condition often signals a semantic drift pattern, emerging beyond the rationed stage, characterized by weakened institutional anchoring, role misalignment among actors, and eroded governance coherence. As PA5 expressed, *"We're not even sure who's responsible for this plan, we just follow orders and do what we can."*

Together, these eight configurations, including four stable and four transitional stages, provide the contextual backbone for interpreting role enactment and semantic modulation in regard to water governance. These transitional patterns not only refine our understanding of governance temporality, but also signal the discursive inflection points wherein semantic modulation becomes most visible. Rather than treating governance as the application of fixed procedures, this study frames it as a situated process of meaning making under environmental stress, forming the first analytical axis of the triadic framework, developed in the sections that follow.

3.2. Interpreting Actor Strategy Roles

Actor strategy roles in agricultural water governance are not fixed positional identities, but they are situationally enacted in response to hydrological stress, semantic expectations, and institutional ambiguity. Based on an inductive analysis of empirical interview data, this study identifies eight prototypical actor roles, each distinguished by its contextual prominence across stable and transitional governance conditions. These roles are neither mutually exclusive nor strictly delineated by organizational boundaries. Instead, they reflect discursive strategies through which actors participate in coordination, negotiate

authority, and construct legitimacy under evolving governance pressures. The following discussion details these roles using illustrative evidence drawn from empirical accounts.

3.2.1. Roles in Stable Contexts

Observers maintain a distance from formal governance structures, relying instead on experiential heuristics and communal memory to anticipate water risk. For instance, *“Old-timers like us can feel the water coming. We don’t need the papers to tell us when to plant early”* (PA1). This role preserves local rhythms and resists premature engagement.

Translators bridge the semantic gap between policy directives and local comprehension, often active within farmer associations or irrigation district offices. PA4 observed, *“Some policies are too direct for farmers, but once they are restated in more familiar terms by the local office, people tend to accept them.”*

Negotiators are activated under strain, mobilizing tacit authority to broker coordination and reallocate resources. As PA2 explained, *“We have to negotiate the compensation; everyone needs to survive.”*

Reframers challenge the normative assumptions embedded in governance logic. Particularly salient during rationing debates, these actors introduce discursive alternatives and moral critiques. PA5 remarked, *“If agriculture is always the one to sacrifice, then maybe it’s time to question the whole logic of industrial prioritization.”*

3.2.2. Roles in Transitional Contexts

Signal amplifiers elevate situational awareness ahead of formal declarations, using informal channels to spread early warnings. PA12 stated, *“We sounded the alarm in our own networks—no need to wait for Taipei to say something.”*

Pacing aligners mediate the tempo of the response, aligning local actions with the evolving expectations of higher-level governance. They calibrate the timing and narrative to avoid premature escalation. As PA3 noted, *“The township office told us to slow down implementation; they said the reservoir wasn’t dropping fast enough.”*

Protocol brokers navigate ambiguities by assembling or adapting the rules to emergent needs. Often operating in conditions of partial clarity, they draw from precedent and use improvisation. PA6 shared, *“Since no one knew who should start the rotation, we looked at past drought logs and improvised based on that.”*

Legitimacy contestants emerge when institutional scripts weaken or fragment. In regard to post-rationing liminality, they voice uncertainty and question procedural authority. As PA5 reflected, *“We’re not even sure who’s responsible for this plan, we just follow orders and do what we can”* (PA5).

3.3. Interpreting Modes of Interpretive Flexibility

Interpretive flexibility in agricultural water governance refers to the discursive capacity of actors to modulate meanings, frame contingencies, and recalibrate narratives in response to evolving hydrological and institutional signals. Unlike formal decision-making protocols, these modes do not follow rigid scripts; rather, they emerge situationally and tactically, enabling actors to navigate uncertainty, mediate stakeholder tensions, and strategically align expectations across governance tiers. Through an inductive analysis of field narratives, this study identifies four principal modes of interpretive flexibility, each reflecting distinct patterns of semantic modulation, as follows:

Conservative framing emphasizes risk containment and discursive restraint, particularly during early warning phases or when institutional messaging remains ambiguous. This mode is often employed by observers and translators who seek to temper expectations, while preserving social stability. As participant PA5 clarified, *“The government just said restrictions are possible, not that irrigation will definitely be cut.”* Similarly, PA9 explained, *“The*

government merely stated there might be restrictions; it doesn't mean irrigation will stop right away; it's to mentally prepare people." These framings serve to delay the escalation of public alarm, allowing local actors to sustain operational continuity during uncertain conditions. This linguistic caution is not merely a matter of information delivery; it operates as a governance tactic that manages both the timing and emotional responses.

Strategic ambiguity involves the intentional use of vague or provisional language to extend decision windows, accommodate multi-level alignment, and maintain institutional flexibility. This mode becomes especially salient during transitional phases, wherein actors must engage in coordination before formal policies are finalized. PA2 explained, *"We shouldn't close the conversation too quickly; farmers need room to adjust."* Additionally, PA12 echoed, *"We usually avoid saying things too definitively, partly because we're still waiting on instructions from above, and partly because farmers are more receptive that way."* Rather than reflecting indecision, such ambiguity functions as a temporal and semantic buffer. It postpones potential confrontation, reduces resistance, and sustains an open discursive space for further adjustments.

Discursive adjustment involves the strategic rewording of sensitive terms to enhance stakeholder receptivity, often by employing euphemisms or culturally familiar phrases. At both central and local levels, actors engage in discursive substitutions to reduce the perception of threat and to maintain legitimacy. PA6 explained, *"We use the phrase 'adjusting allocation' instead of 'rationing'; farmers respond more calmly."* Similarly, a hydraulic engineer at the local level (PA8) added, *"We avoid saying 'rationing' and instead use terms like 'zonal adjustment' or 'irrigation scheduling', which farmers find more acceptable."* These examples illustrate a deliberate pattern of semantic softening that facilitates smoother communication and mitigates potential resistance. Notably, discursive adjustment is not merely rhetorical; it plays a constitutive role in shaping how policies are perceived and implemented in practice.

Narrative reframing involves the rearticulation of water-related stress not as a crisis but as an opportunity, thereby enabling a forward-looking repositioning of governance initiatives. This mode often appears during or after high-stress periods, particularly when legitimacy must be reestablished or policy goals reoriented. A local leader (PA7) remarked, *"This water restriction isn't a crisis, but a chance to promote smart irrigation,"* reframing the scarcity condition as a pathway to innovation. PA11 further emphasized, *"Technologies such as AIoT, which refers to the integration of artificial intelligence with the Internet of Things, have already been implemented and are soon to be applied in broader contexts."* In both cases, reframing serves to transform perceived constraints into narrative assets, supporting a transition from reactive coping to proactive adaptation.

3.4. From Pairings to Tensions: Constructing Situated Governance Configurations

While the previous sections elaborated on the three analytical axes, namely governance contexts, actor strategy roles, and interpretive flexibility, this section turns to their intersection. Rather than treating these axes as abstract typologies, we examine their interrelation through empirically grounded configurations. Section 3.4.1 identifies recurring role–meaning pairings under stable hydrological conditions, whereas Section 3.4.2 traces how these alignments are recalibrated during transitional states. Together, these analyses provide the foundation for understanding how situated governance configurations emerge from the interplay of the three analytical axes.

3.4.1. Mapping Role–Meaning Pairings Under Stable Conditions

This subsection maps four empirically grounded governance configurations, labeled A1 through to D4, that illustrate how actor roles and discursive strategies align under stable or gradually tightening hydrological conditions. Rather than serving as fixed tem-

plates, these configurations reflect patterned pairings between observed roles and semantic practices. They reveal how governance actors maintain coherence, defer decisions, negotiate legitimacy, and reframe challenges as environmental signals evolve. These four configurations trace a trajectory from routine observation to strategic ambiguity, narrative negotiation, and legitimacy reconstruction, marking the semantic contours of governance prior to the peak of institutional strain.

A1 Configuration: Routine Alignment

The configuration of routine alignment is grounded in an understanding of stability, derived from the continuous observation of routines. During periods of stable water conditions, governance actors tend to adopt a low-engagement stance, characterized by descriptive language and minimal intervention. Their role centers on observation rather than escalation.

One interviewee explained, *“When the water condition is stable, there’s nothing much to discuss, we just proceed as scheduled”* (PA1). Another added, *“We just do regular inspections and only report if something unusual happens”* (PA2). These responses illustrate a preference for maintaining the routine, avoiding the premature activation of institutional attention. The A1 stance, thus, reflects a conservative framing aligned with low-risk perception and administrative continuity.

B2 Configuration: Anticipatory Buffering

Anticipatory buffering corresponds to the use of strategic ambiguity under moderately tight conditions. In the early stages of water stress, prior to any formal policy announcement, actors often assume a translational role by managing uncertainty through the use of cautious language. Rather than offering definitive answers, they employ vague phrasing to defer commitments and mitigate external pressure.

One participant explained, *“At the time, we weren’t sure if restrictions would happen, so we just said ‘it depends on the situation,’ that’s safer publicly”* (PA2). Another added, *“Internally we were drafting contingency plans, but outwardly we just said ‘still under discussion’”* (PA3). These practices reflect strategic ambiguity, allowing actors to retain flexibility, avoid misalignment, and adjust narratives as decisions evolve. Through the use of such expressions, language operates as a tool of governance, helping to manage expectations and maintain institutional room to maneuver under emerging stress.

C3 Configuration: Delayed Reframing

Delayed reframing refers to the reinterpretation of scarcity through the use of historical narratives. During periods of severe water stress, governance actors often assume the role of negotiators, strategically employing language to balance competing interests and uphold institutional stability. Instead of issuing top-down directives, they draw upon familiar drought experiences to cultivate understanding and reinforce a shared sense of collective endurance.

As one participant noted, *“We bring in local leaders to explain, it’s about sharing the burden, not placing blame”* (PA4). Another added, *“We refer back to past drought experiences, to show this isn’t the first time and that it can be managed”* (PA5). These narratives help soften tension and expand the space for dialogue, enabling actors to position current challenges within a broader history of adaptation. By reframing scarcity through shared memory, negotiators strengthen their legitimacy and encourage cooperative responses.

D4 Configuration: Legitimacy Recasting

Legitimacy recasting refers to the strategic manipulation of legitimacy under conditions of water rationing. As rationing becomes inevitable, governance actors employ forward-looking narratives to recalibrate institutional legitimacy. These narratives reframe drought not as a failure of planning, but as a structural condition that necessitates adaptive responses.

One policy advisor explained, *“Water rationing wasn’t our decision. It’s where the system led us. What we can do is minimize the harm”* (PA6). By framing action as a response to systemic forces, actors reduce the perceived culpability, while emphasizing their role in managing downstream impacts. Another noted, *“With these century-scale droughts, we’re learning to live with them. It’s going to become more frequent”* (PA7). This statement reflects an emerging narrative logic wherein climate irregularity is internalized as the new normal.

In regard to this configuration, the reframer, subject to a rationing condition, is engaging in narrative reconstruction. Rather than defending prior decisions, actors recast the water crisis as part of a broader environmental transition. Legitimacy is not anchored in policy consistency, but in the capacity to articulate a credible pathway through long-term uncertainty. Through this shift, storytelling becomes a governance function that enables institutional actors to sustain trust and coordinate collective adjustment.

3.4.2. Tracing Discursive Recalibrations Under Governance Strain

The following four configurations, labeled E5 through to H8, trace how governance alignments unravel under increasing hydrological strain and institutional ambiguity. In contrast to the more cohesive pairings seen in stable contexts, these transitional states reveal growing tensions between role expectations and semantic articulation. Actors navigate ambiguity through semantic buffering, narrative hedging, anticipatory overreach, or passive compliance, resulting in interpretive disjunction and diminished coherence. Together, these configurations capture the fragility of governance under stress, exposing how coordination gives way to improvisation and, eventually, to institutional drift.

E5 Configuration: Reactive Repositioning

Reactive repositioning is grounded in transitional drift and semantic buffering during the early stages of water stress. At the onset of hydrological pressure, certain governance actors display a diverging stance, marked by delayed adjustments to narratives and role enactment. Rather than initiating clear shifts in communication or responsibility, they adopt subdued or ambiguous messaging to manage institutional responses and shape public perception. This behavior serves as a form of semantic buffering, deferring overt action as uncertainty continues to intensify.

One interviewee observed, *“There wasn’t a clear rationing decision yet. We were just asking people to conserve, not launching any formal response”* (PA8). Another noted, *“Sometimes the media reports first, so we gauge the sentiment before deciding whether to respond”* (PA4). These accounts suggest an intentional withholding of discursive escalation, often due to institutional inertia or limited preparedness. Rather than responding proactively, actors maintain a low-profile stance, allowing them to defer commitments until conditions become more defined. This approach highlights how ambiguity can be mobilized as a governance tool during the early stages of risk escalation.

F6 Configuration: Narrative Realignment

Narrative realignment exemplifies the role of “pacing aligners” in navigating ambiguity through the use of layered discursive strategies. During the transition from moderate to severe water stress, certain governance actors adopt a gradualist stance, characterized by cautious modulation rather than full alignment with escalating urgency. These actors construct layered narratives that simultaneously reference prior experiences and present uncertainties, thereby enabling adaptive coordination under ambiguous institutional conditions.

One participant remarked, *“We’re talking about compensation plans, but we’re also saying let’s wait and see, so both sides get something”* (PA9). This reveals a strategy of hedging, maintaining semantic flexibility, while avoiding firm commitments. Another interviewee observed, *“People still reference the 2002 drought, but that’s outdated. The context and technology*

are different now” (PA11), indicating how legacy narratives persist, even when misaligned with present conditions.

These expressions suggest a form of narrative hybridization. Actors balance institutional continuity with discursive adaptability, often at the cost of decisive coordination.

G7 Configuration: Distributed Improvisation

Distributed improvisation refers to the role of substituters operating under interpretive disjunction during periods of transitional uncertainty. The G7 configuration illustrates a situation in which actors assume anticipatory roles by articulating forward-looking narratives before institutional decisions are finalized. Such premature communication generates a gap between public messaging and official positions, often leading to confusion and undermining institutional credibility.

As one participant explained, *“We spoke too early, and the authorities hadn’t finalized anything. People thought we were spreading rumors”* (PA12). Another noted, *“We were already preparing internally, but publicly we just said we’re monitoring reservoir levels”* (PA6). These accounts highlight the tension that arises when strategic communication outpaces institutional alignment. Without clear mandates, actors risk overstepping their roles, leading to interpretive disjunction and uncertainty within the governance environment.

H8 Configuration: Semantic Drift

Semantic drift is rooted in the phenomenon of legitimacy contestation during the transition from the rationing phase to the post-rationing phase. The H8 configuration illustrates a governance stance in which actors operate under prolonged uncertainty, marked by semantic inconsistency and role confusion across all of the hydrological phases. Even during the implementation stage, some participants remain disconnected from clear institutional directives, instead relying on vague or contradictory language. This stance does not merely stem from individual indecision, but reflects deeper structural ambiguity and blurred lines of accountability within the governance system.

One participant noted, *“We’re not even sure who’s responsible for this plan. We just follow orders and do what we can”* (PA5). Another echoed the disconnect, stating, *“The directive says to prepare Plan A, but in reality they ask us to follow Plan B”* (PA10), reflecting how mismatched expectations further destabilize semantic alignment. In a particularly revealing admission, a third actor shared, *“We follow national water guidance, no local improvisation here..., whatever the central office says, we do. There’s no way for us to adapt things locally, no one here dares to take that kind of risk”* (PA12). This expression demonstrates not only discursive retreat, but a structural forfeiture of adaptive agency, where the fear of institutional reprisal overrides local innovation.

Such expressions expose a disjuncture between official mandates and operational realities, wherein semantic maneuvering is no longer a strategic choice, but a reflexive response when subject to unclear authority structures. In regard to this configuration, ambiguity is not leveraged for flexibility, but is endured as a symptom of institutional retreat. The accumulation of unacknowledged semantic fractures, role evasion, and directive misalignment reflects more than just a temporary dysfunction, suggesting a deeper erosion of institutional coherence. When actors begin to dissociate from decision making and merely comply without interpretation, governance shifts from operative coordination to symbolic enactment. Rather than sustaining adaptability, the system becomes marked by semantic inertia, revealing a configuration that embodies the threshold of governance exhaustion.

4. Discussion

4.1. Naming and Interpreting the LAWFGS Tri-Axial Framework

Building on the eight empirically derived governance configurations (A1–H8) outlined in the previous section, this section consolidates the analytical findings into an integrative

interpretive framework. Termed the “Local Adaptive Water Governance under Flexible Governance Settings” (LAWFGS), this framework captures the patterned interplay among governance contexts, actor strategy roles, and interpretative flexibility. Rather than functioning as a fixed typology, the LAWFGS framework operates as a context-sensitive analytic approach that reflects the evolving alignment and misalignment of semantic strategies across institutional conditions.

The naming of the LAWFGS framework reflects two interrelated theoretical premises. First, it addresses the rising imperative of adaptive localization in regard to agricultural water governance amid climate-induced stress. Second, it foregrounds the strategic function of narrative modulation in enabling situated coordination and institutional adaptability. These premises are operationalized through the tri-axial framework, which conceptualizes governance not as a set of fixed rules or static roles, but as dynamic semantic trajectories shaped by actor enactments, discursive adjustments, and contextual pressures.

To illustrate this structure, Figure 1 presents the LAWFGS semantic governance field map, spatializing the eight governance configurations (A1–H8) across three conceptual axes: (1) governance contexts, from normal supply to rationed conditions; (2) interpretative flexibility, from conservative containment to adaptive reframing; and (3) actor strategy roles, ranging from stable execution to improvisational adjustment.

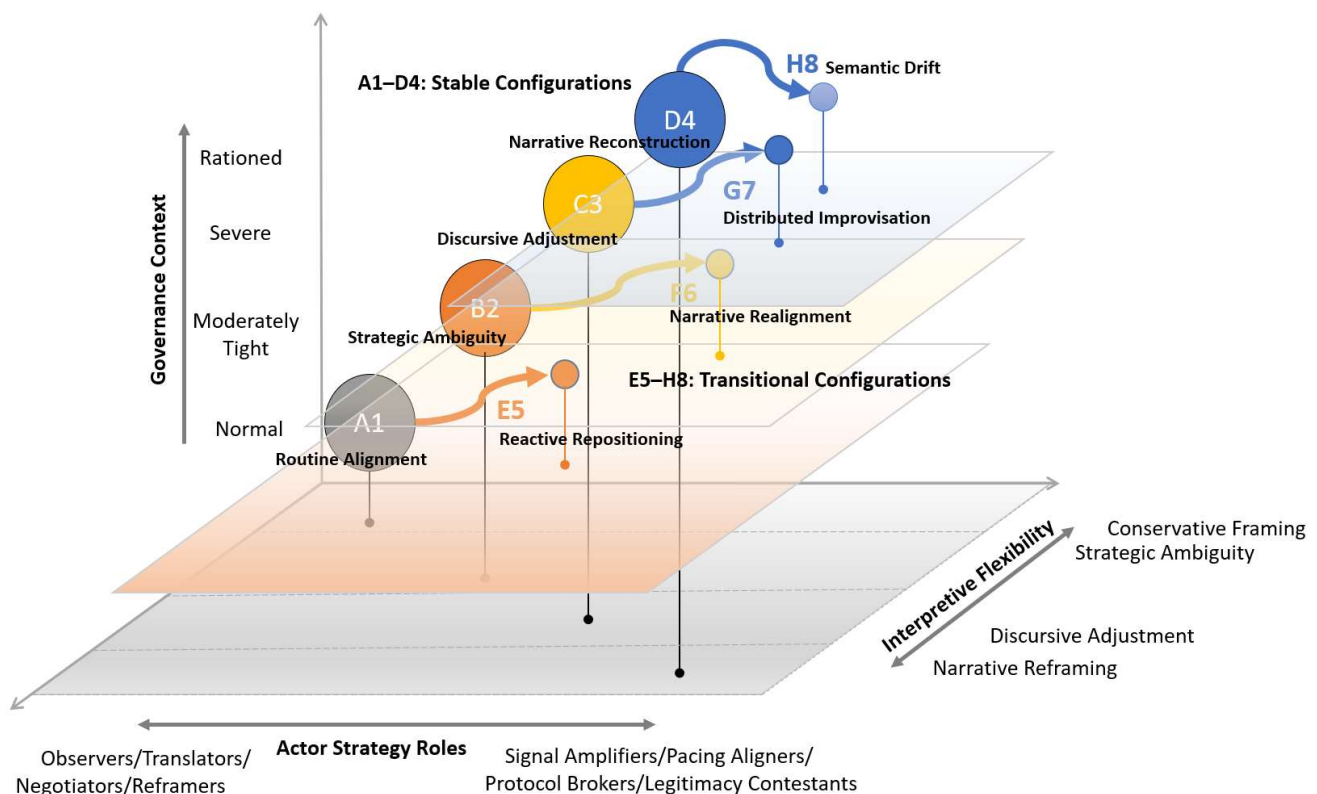


Figure 1. LAWFGS semantic governance field map. Note: This figure presents the LAWFGS semantic governance field map, illustrating eight empirically derived governance configurations (A1–H8), along three conceptual axes: governance context (vertical axis), actor strategy roles (horizontal axis), and interpretative flexibility (diagonal axis). The vertical axis tracks shifts in hydrological stress from normal to rationed conditions, while the horizontal axis differentiates actor roles from observers and translators to signal amplifiers and legitimacy contestants. The diagonal axis captures the degree of interpretive flexibility, ranging from conservative framing and strategic ambiguity to discursive adjustment and narrative reframing. Configurations A1–D4 reflect stable governance alignments, whereas E5–H8 represent transitional or misaligned states under increased institutional strain. Colored trajectories indicate potential pathways of semantic adaptation and role recalibration across different phases of governance pressure.

These configurations are clustered into two semantic zones: a relatively coherent stable field (A1–D4) and a progressively fractured transitional field (E5–H8). The spatial distribution reflects not linear escalation, but multidirectional realignments across the axes, indicating the relational tensions that shape interpretive governance under stress.

Semantic tactics, such as strategic ambiguity and discursive adjustment, function not as discursive byproducts, but as situated governance instruments. They mark the zones of semantic recalibration wherein meaning, authority, and expectation are renegotiated in response to institutional opacity or hydrological volatility. This interpretive mapping sets the stage for a deeper examination of how actors navigate semantic positioning under contextual stress. Figure 2, labeled “Radar Mapping of LAWFGS across Semantic Governance Configurations,” expands on the relational dynamics embedded within the LAWFGS field, highlighting how discursive strategies and role adjustments evolve interactively along the three axes.

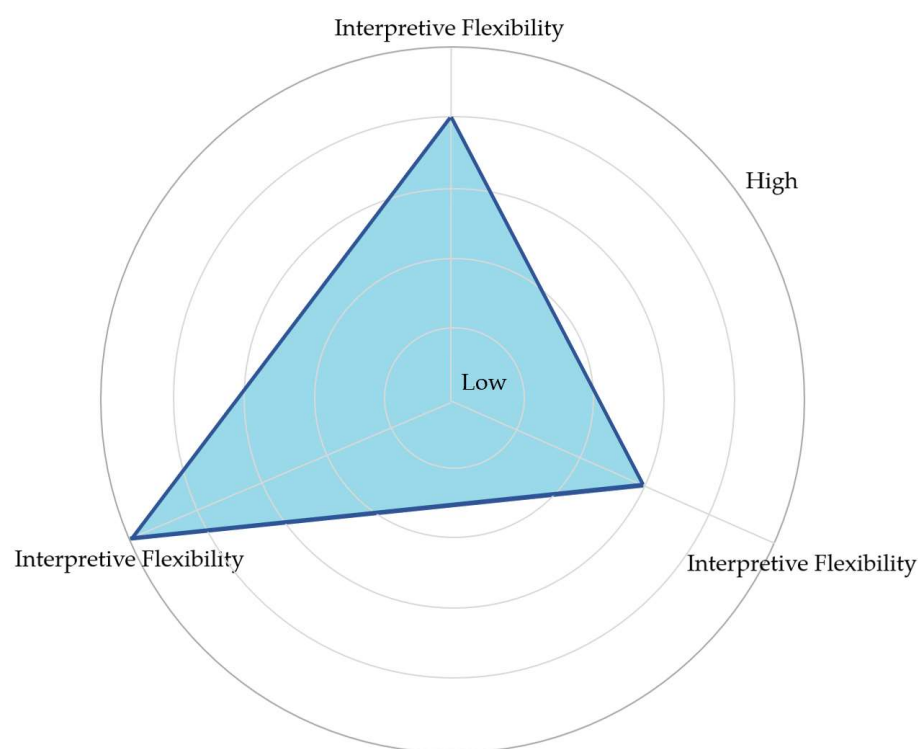


Figure 2. Radar mapping of LAWFGS across semantic governance configurations. Note: This figure presents a radar-based mapping of the LAWFGS framework, illustrating how governance configurations (A1–H8) are situated across three semantic axes: governance context, actor role strategy, and interpretive flexibility. The shaded area represents a hypothetical configuration profile characterized by moderate discursive capacity, transitional role alignment, and context-sensitive adaptation. Rather than depicting fixed types or evaluative categories, the visualization offers a relational perspective on how semantic positioning may vary under different hydrological and institutional conditions. The relative area enclosed by each configuration reflects its composite tendencies across the three axes, with broader spreads suggesting greater engagement with semantic adaptation and narrower profiles indicating more constrained coordination flexibility. This visualization serves to illustrate potential alignment patterns rather than prescribe evaluative benchmarks.

The radar field in Figure 2 visualizes these configurations as relational clusters within a tri-axial space. What emerges from this visualization is not a typology of stages, but a shifting landscape of possible alignments. Under moderate stress, for example, configurations such as C3 (delayed reframing) suggest that actors use semantic deferral to synchronize timing and soften inter-agency conflict. These tactics, such as invoking an “anticipated

evaluation” or “to be confirmed”, create a discursive buffer that allows temporary stability, while delaying irreversible decisions.

In high-pressure contexts, more dynamic coupling becomes visible. Configuration G7 (distributed improvisation) reveals how actors operating under fractured authority begin to realign roles through tacit coordination and shared narrative cues. Here, governance coherence is achieved not by unified commands, but by parallel improvisations that remain loosely synchronized through discursive common ground. Similarly, in configuration H8 (semantic drift), the erosion of stable referents leads to a decoupling of institutional signals and field action. The phrase “we follow orders, but they change daily” reflects an interpretive vacuum, wherein legitimacy is sustained only through performative compliance and passive ambiguity.

Such configurations underscore the importance of viewing agricultural irrigation governance not only through the lens of rules or roles, but as an evolving interaction of interpretive repertoires, relational positioning, and institutional inertia. While the three axes provide the structural coordinates, their intersections, whether through hesitation, acceleration, or drift, are where meaning is actively reshaped. The spatial spread across the radar field does not indicate strength or maturity, but degrees of semantic accommodation and operational friction.

By making these couplings visible, the LAWFGS framework enables researchers and practitioners to discern latent patterns of coordination, disruption, and adaptation. It surfaces the performative grammar through which actors negotiate institutional ambiguity, reconfigure roles, and manage expectations. These insights are especially relevant in fragmented governance contexts, wherein synchronization depends less on structural integration and more on shared interpretive rhythms.

This interpretive capacity becomes particularly salient when Figure 2 is read not as a static typology, but as a relational radar that visualizes how governance stances may emerge, stretch, or collapse under shifting stress regimes. Rather than depicting sequential phases, the horizontal extension from C3 to G7 illustrates a widening pattern of discursive improvisation, while the drift toward H8 signals the erosion of shared referents amid institutional fatigue. Such spatial trajectories do not prescribe interventions, but invite reflective inquiry into how semantic accommodation, role negotiation, and communicative alignment evolve under contextual strain.

The tri-axial configurations presented in Figures 1 and 2 do not function as predictive devices, but rather serve as visual syntheses of the interpretive and strategic tensions embedded within the LAWFGS framework. They facilitate the mapping of actor roles in relation to the semantic elasticity and institutional constraints that dynamically shape discursive choices. For instance, a negotiator operating under moderately strained conditions may shift toward discursive adjustment or strategic ambiguity, depending on the contextual feedback received. In this regard, Figure 2 functions as an interpretive tool that visualizes the spatial nexus of the three axes. It complements the empirical configurations illustrated in Figure 1 (Section 3.3) and establishes a conceptual foundation for the applicability-focused analyses detailed in Sections 4.4 and 4.5.

4.2. Theoretical Positioning of LAWFGS Framework in Relation to IWRM

While IWRM has long served as the dominant paradigm in global water governance, its applicability to dynamic, stress-intensified local contexts remains contested. This study focuses specifically on the evolving governance responses to escalating hydrological stress in northern Taiwan, tracing the discursive and strategic shifts as conditions transition from normal supply to formal water rationing. Rather than aiming for a comprehensive model

of water governance, the LAWFGS framework addresses the interpretive and institutional challenges that emerge under gradually intensifying water scarcity.

As reviewed in the relevant literature, several recent studies have exposed critical limitations in regard to the local implementation of IWRM. These include underdeveloped mechanisms for contextual interpretation, insufficient coordination among heterogeneous actors, and restricted operability in dynamic field conditions [3,17]. These critiques underscore how IWRM's normative logic often falters in practice, particularly when institutional design outpaces actors' interpretive and operational capacities. This section reflects on these deficiencies and elaborates on how the LAWFGS model offers a context-sensitive governance framework that is both translatable to and grounded in local realities.

In contrast to IWRM's structural logic, characterized by top-down integration and hydrometric rationality, the LAWFGS framework offers a theoretical corrective by reconceptualizing water scarcity not as an objective threshold, but as a socially mediated condition, shaped through actors' situated experiences, risk imaginaries, and interpretive repertoires [4,13]. Subject to this reframing, governance does not unfold linearly from centralized mandates; rather, it evolves through localized practices of meaning making and role recalibration in response to hydrological volatility. This view aligns with a broader scholarly turn away from technocratic planning toward adaptive, actor-centered governance [3,10]. The LAWFGS framework advances this orientation by offering a semantic–operational lens that renders visible the dynamics of local coordination, institutional improvisation, and strategic ambiguity. Specifically, it addresses two widely acknowledged limitations of IWRM: the inadequate accommodation of actors' interpretive agency [2] and the restricted capacity to facilitate decentralized coordination in regard to fragmented governance regimes [5]. The LAWFGS framework, thus, offers a complementary perspective to established governance models, emphasizing the analytical value of semantic responsiveness in contexts shaped by localized adaptation and institutional fluidity.

The second corrective is epistemological in nature, addressing IWRM's limited capacity to accommodate the multiplicity of roles and ambiguous responsibilities that characterize many regional governance settings. Whereas IWRM tends to equate integration with institutional design [6,17], the LAWFGS framework foregrounds the contingent enactment of governance through role-based semantic mediation. By treating “contextual fragments” and “role intersections” as key analytical units, the model maps how policy signals are discursively reframed and enacted through local adaptation. This reframing does not shift governance from execution to invention, but rather toward a more semantically attuned and flexibly coordinated mode of action subject to institutional uncertainty.

4.3. Enriching Theories of Situated Governance and Actor Multiplicity

The conceptual foundation of the LAWFGS framework draws upon two converging strands in governance theory: situated governance and actor multiplicity. Situated governance suggests that governance is not merely a matter of top-down implementation. Rather, it is a contextually embedded process involving meaning negotiation, local sense making, and strategic adaptation. Actors interpret institutional cues, manage uncertainties, and perform their roles within fluid ecological and organizational environments [7]. This perspective challenges the rational–technical framing often associated with conventional water governance models, and instead emphasizes how meanings are produced and contested during everyday practice [18].

In parallel, the principle of actor multiplicity acknowledges the differentiated agency of stakeholders. Farmers, irrigation managers, township officials, and national policymakers all operate according to distinct institutional alignments, narrative resources, and role expectations [4]. These roles do not simply follow formal mandates. They are shaped by

local discourses, embedded routines, and evolving configurations of responsibility. The idea that each actor group carries its own semantic register reflects what Bevir and Rhodes describe as the cultural performativity of governance [19].

The LAWFGS framework contributes to the literature by illustrating how discursive adjustments, role shifts, and contextual recalibrations emerge and interact within governance fields marked by semantic ambiguity. This dynamic interplay does not operate in isolation. It connects to material triggers, such as drought forecasts, policy briefings, and irrigation schedules, which circulate as interpretive mediators within the governance environment. In this respect, the model shares an affinity with Actor-Network Theory, particularly in recognizing that non-human elements, such as technical documents, data maps, and terminologies, are not neutral carriers of information. Rather, they co-produce meaning and influence how governance problems are framed and acted upon [20].

By treating governance as an emergent field of situated action rather than a procedural logic of rules-based compliance, the LAWFGS framework offers a dynamic frame for analyzing how language, institutional signals, and role enactments jointly produce operational coherence. This emphasis on semantically mediated coordination aligns with the notion of culture as a toolkit, wherein actors improvise using the available symbolic resources to sustain continuity amidst uncertainty [21]. Governance, in this sense, is less about the execution of rules and more about the performative calibration of legitimacy and operability within complex and shifting institutional terrains.

4.4. Semantic Ambiguity and Institutional Adaptation: From Uncertainty to Operability

Institutional ambiguity is often framed as a governance bottleneck, something to be minimized or corrected through clearer regulation and accountability. However, the LAWFGS framework offers a different interpretation. In contexts where policy signals are vague and actor responsibilities are only loosely defined, ambiguity does not necessarily undermine governance. Instead, it functions as a performative condition that allows for negotiation, temporary alignment, and adaptive delay. These conditions do not trigger institutional breakdown, but rather sustain operability in complex settings. This view is consistent with studies in interpretive policy analysis and governance bricolage, which argue that ambiguity can serve as a resource for maintaining flexibility and reducing resistance in politically sensitive or institutionally fragmented fields [22,23].

Rather than treating ambiguity as analytical residue, the LAWFGS model frames it as a generative structure. It emerges through discursive adjustment, role improvisation, and interpretive calibration. These practices allow actors to manage ambiguity not by eliminating it, but by embedding it into their strategic responses. The concept aligns with Cleaver and Whaley's notion of situated rationality, which emphasizes how governance unfolds through embedded negotiations rather than by strictly adhering to formal procedures [10].

Within the LAWFGS model's tri-axial structure, composed of interpretive flexibility, role mobilization, and configuration variation, institutional vagueness becomes analyzable. For example, expressions such as "case-by-case" or "adjusting regionally" are not incidental phrases. They are situated responses that enable actors to uphold legitimacy and maintain cohesion under resource stress. Gray similarly observed that semantic ambiguity can absorb institutional fragility and defuse conflict [24]. In such environments, ambiguity acts as a lubricant rather than an obstacle, allowing different stakeholders to move forward, even when complete agreement has not been reached [25].

This reconceptualization also offers a pathway for theoretical refinement. Rather than associating ambiguity with institutional dysfunction, the model treats it as a latent resource that actors can mobilize strategically. This interpretation is consistent with the findings of Nikas [14], who advocates for modular and actor-responsive frameworks that accommodate

reflexivity and anticipation under conditions of uncertainty. By defining ambiguity as a field-specific logic that shapes the response capacity, the LAWFGS framework provides tools for interpreting the functional role of discourse in regard to governance dynamics.

In addition, this study demonstrates how SGT can be extended beyond mapping discursive arenas to supporting context-sensitive model construction. Through its relational orientation, SGT helps reveal how interpretive flexibility, role realignment, and governance configuration shifts interact to support strategic adaptation. This integration highlights the generative capacity of ambiguity, not as a theoretical gap, but as a dynamic element in the architecture of semantic governance.

4.5. Applicability of the LAWFGS Framework Across Different Governance Phases

While Section 4.1 delineates the conceptual rationale and theoretical contribution of the LAWFGS framework vis-à-vis existing governance paradigms, this section turns to its practical applicability across the different governance phases observed in the case context. It illustrates how the framework enables a context-sensitive reading of actor strategies and semantic modulation under varying hydrological stress levels, thereby bridging analytical abstraction and operational relevance.

In regard to phases characterized by relatively stable or early-stage stress, such as configurations A1 (routine alignment), B2 (anticipatory buffering), C3 (delayed reframing), and D4 (legitimacy recasting), the LAWFGS framework sheds light on how semantic tools are used to extend flexibility within institutional constraints. Actors deploy deferral phrases (e.g., “subject to future evaluation”, “based on actual conditions”) to buy time, distribute accountability, or subtly reassign responsibility. These expressions are not merely bureaucratic artifacts, but serve as coordination buffers that allow agencies to absorb ambiguity without causing governance paralysis.

As hydrological conditions evolve into acute scarcity or institutional destabilization, exemplified by configurations E5 (reactive repositioning), F6 (narrative realignment), G7 (distributed improvisation), and H8 (semantic drift), the model captures how interpretive strategies transition from stasis to transformation. Actors engage in discursive improvisation, reframing the crisis not as failure, but as a structural inevitability (“we’re adapting to century-scale droughts”), thereby reconstituting legitimacy, while enabling decentralized coordination. In regard to such conditions, the LAWFGS framework reveals how governance is sustained through provisional alignments and discursive signaling, rather than formal authority alone.

By foregrounding these semantic practices, the LAWFGS framework complements IWRM’s integrationist framework with an interpretive–operational layer that enhances field-level governance. While IWRM provides structural coherence and allocative logic, it often assumes role clarity and institutional stability [2,3,6]. The LAWFGS framework, in contrast, responds to the everyday realities of fragmented authority, role ambiguity, and communicative tension by offering a lens to detect and work with discursive signals. In doing so, it enables governance actors to modulate their strategies without violating formal mandates and, thereby, enhancing IWRM’s practical applicability in uncertain, multi-actor contexts, such as agricultural irrigation systems.

Taken together, these insights position the LAWFGS framework not as a replacement, but as a context-sensitive complement to existing governance models. Its emphasis on semantic responsiveness, actor role modulation, and interpretive flexibility offers a vocabulary for examining how the meaning of governance is enacted under stress. Rather than prescribing interventions, the framework helps make visible the relational dynamics through which coordination unfolds across different drought phases. Building on these

insights, the next section illustrates how core configurations can be interpreted alongside practical governance approaches, linking conceptual reflections with field-level complexity.

4.6. Translating LAWFGS Configurations into Agricultural Water Governance Guidance

The LAWFGS model, rooted in discursive configurations emerging from Taiwan's agricultural irrigation governance under hydrological stress, offers not only an interpretive mapping of actor discourse, but also practical insights into how semantic orientations may inform governance interventions. This section illustrates how the eight configurations (A1–H8) may guide context-sensitive policy actions in regard to local irrigation systems.

Each configuration reflects a patterned interplay among actor positioning, discursive strategy, and governance context. Rather than prescribing uniform responses, the model enables practitioners to read semantic signals, such as shifts from procedural conservatism to reframing urgency, as early indicators of emerging needs or latent coordination gaps. These signals can be translated into targeted communicative strategies, role clarifications, and engagement protocols, suited to the governance phase and actor constellation.

To support operationalization, Table 2 presents suggested interventions associated with each configuration. These suggestions are not deterministic, but provide an interpretive reference for irrigation authorities, water district coordinators, and agricultural planning units seeking to navigate uncertainty without triggering role confusion or governance inertia.

Table 2. LAWFGS configurations and suggested governance guidance.

Configuration	Semantic Pattern Description	Suggested Governance Guidance
A1: Routine Alignment	Cautious, low-visibility monitoring under stable conditions.	Initiate low-salience risk briefings; prepare early-stage communication templates.
B2: Anticipatory Buffering	Use of vague language to delay decisions or shift responsibility.	Deploy interpretive memos clarifying permissible improvisation; monitor ambiguity to prevent drift.
C3: Delayed Reframing	Tactical modulation of rhetoric to balance institutional and local pressures.	Convene vertical coordination workshops; introduce scenario-based response protocols.
D4: Legitimacy Recasting	Legitimation via reframed collective hardship narratives.	Launch community storytelling forums; distribute pre-drought adaptation success stories.
E5: Reactive Repositioning	Aggressive justification of intervention via strategic reframing.	Empower mid-level actors to communicate urgency; utilize memory-based risk narratives.
F6: Narrative Realignment	Navigating operational ambiguities using calibrated speech.	Provide execution-level semantic briefings; reinforce horizontal consistency.
G7: Distributed Improvisation	Bargaining via ambiguity to manage equity and compliance.	Create deliberation spaces; use ambiguous phrasing selectively to maintain flexibility.
H8: Semantic Drift	Role confusion, semantic incoherence, institutional disconnection.	Activate institutional clarity protocols; assign semantic liaisons; address directive misalignment.

Note: This table summarizes the interpretive logic and suggested governance guidance for each of the eight LAWFGS configurations. The semantic patterns were derived from grounded coding of actor discourse across distinct hydrological phases, and reflect typical interactions among governance context, actor strategy roles, and discursive flexibility. The governance guidance recommendations are not prescriptive solutions, but are context-sensitive interpretive suggestions. They are intended for agricultural irrigation authorities and coordination units working within centralized planning frameworks, and should be adapted with respect to local institutional, ecological, and organizational constraints. The configurations are sequenced to reflect an approximate progression of water stress, although in practice they may appear in overlapping or recursive patterns.

These guidance pathways are strictly intended for use in local agricultural irrigation systems, wherein semantic mediation plays a key role in regard to centralized planning and fluctuating water stress. The LAWFGS model does not presume transferability to urban or cross-basin governance contexts, nor does it generalize beyond the institutional characteristics of the empirical setting. However, the methodological logic of interpreting governance through semantic configurations may still be applicable to other sectors, provided that careful contextual calibration is undertaken.

By shifting the focus from formal procedures to interpretive enactments, this approach foregrounds the often overlooked role of language in governance adaptation. Rather than offering static prescriptions, the LAWFGS framework helps identify when and where discursive misalignment signals the need for intervention, whether semantic, procedural, or structural.

Table 2 offers a practical translation of each LAWFGS configuration into corresponding governance suggestions, illustrating how semantic configurations may inform situated responses under evolving water stress. For instance, during the E5 transition phase, the discursive shift toward narrative repositioning is associated with the emergence of intermediary coordination efforts and context-sensitive communication strategies. These suggested responses do not prescribe fixed solutions, but offer interpretive entry points for discerning when discursive or procedural adjustment may be contextually appropriate.

5. Conclusions

5.1. Synthesis of Findings

This study emerged from a recognition that governance under hydrological stress is not simply a matter of institutional design or technical allocation, but a deeply situated negotiation of meaning, responsibility, and legitimacy. In periods of intensifying drought and resource pressure, actors are often required to interpret ambiguous directives, reposition their roles within unstable hierarchies, and make decisions amid institutional drift. Rather than assuming that governance is pre-scripted by formal rules or centrally imposed priorities, we asked: How do actors, embedded in local irrigation systems, semantically make sense of uncertainty, and how does such sense making shape governance practice?

To interpret these dynamics, we developed the LAWFGS model not as a predictive tool or static taxonomy, but as a context-sensitive analytic approach that visualizes patterned interactions across three interwoven dimensions: governance context, actor strategy roles, and interpretive flexibility. These dimensions were not predefined; rather, they emerged through iterative engagement with empirical materials using SGT. The model captures how actors employ semantic modulation, role realignment, and discursive ambiguity to navigate shifting institutional conditions. Importantly, the LAWFGS framework does not prescribe ideal types of governance, but instead reveals the contingent and often fragile nature of coordination under stress.

In addressing the research questions, this study revealed that governance actors often respond to uncertainty not through rigid compliance, but through the strategic use of language, such as expressing conditional commitments, reframing their roles, or intentionally deferring clarity to preserve flexibility. This finding speaks directly to RQ1, highlighting how semantic choices function as adaptive tools for navigating institutional volatility. Regarding RQ2, the analysis shows that actor roles are not fixed categories, but are dynamically co-constructed through interactional and discursive practices, with role shifts becoming particularly evident during transitional phases wherein formal responsibilities were blurred. As for RQ3, the LAWFGS model demonstrates how role, discourse, and context intersect to generate recurring governance configurations, each characterized by its own logic of semantic negotiation and adaptive positioning.

Theoretically, this study contributes to three intersecting streams of literature. First, it offers a contextual corrective to dominant approaches within IWRM, emphasizing not top-down institutional alignment, but situated semantic adaptation and role improvisation. Second, it advances the methodological reach of SGT, by transforming it from a narrative interpretive tool into a structured framework for modeling semantic fields of governance. Third, it extends ongoing dialogues on ambiguity, discursive governance, and institutional adaptation by identifying how semantic drift, negotiated vagueness, and role elasticity constitute not failures of policy, but the core medium through which governance is enacted under constraints.

In sum, by foregrounding meaning making as a central mechanism of governance, this study reframes agricultural water coordination as a process of discursive adaptation and semantic calibration. The LAWFGS framework enables researchers and practitioners to recognize not only what decisions are made, but how those decisions are linguistically framed, strategically delayed, or institutionally absorbed. Rather than offering a definitive solution, the model invites reflexive engagement with the semantic infrastructures that support, distort, or destabilize governance in hydrologically uncertain contexts.

5.2. Future Research Directions

The findings of this study open up several generative pathways for extending the LAWFGS framework, both conceptually and operationally. These directions aim not to finalize the model's scope, but to invite further inquiry in regard to its versatility and contextual depth across governance domains.

First, comparative applications across diverse hydrosocial and institutional settings offer promising avenues for exploring the framework's contextual elasticity. Examining governance configurations in regard to urban drought management, transboundary water disputes, or flood mitigation regimes may reveal how semantic strategies and role reconfigurations shift across political, ecological, and organizational terrains. Such comparative work would test the framework's analytical flexibility, while enriching its interpretive scope.

Second, the LAWFGS framework could be embedded into digital governance infrastructures, such as AI-assisted forecasting platforms or open data participatory networks. These applications would position the framework as a real-time, context-aware decision support scaffold that aligns semantic interpretation with automated alerts or responsive policy triggers. Such integration would help translate discursive insights into adaptive governance approaches. Building on these theoretical articulations, future research may further expand the LAWFGS framework by advancing its operational dimensions and applied relevance.

Third, future research may focus on operationalizing the LAWFGS framework by developing measurable indicators grounded in its core constructs, namely semantic flexibility, role-shifting frequency, and governance configuration shifts, as summarized in Appendix A Table A3. These operational categories offer a foundational matrix for translating the model across case studies, enabling empirical testing, institutional learning, and the design of context-sensitive policy feedback loops. By delineating contextual phases, discursive adjustment types, and actor role dynamics, the framework moves beyond heuristic abstraction toward becoming a mixed-method diagnostic tool. In doing so, the LAWFGS framework contributes not only to the theorization of situated governance, but also to the practical crafting of responsive, co-constructed, and trust-based mechanisms for managing complexity in water-stressed environments.

In sum, these trajectories do not seek to universalize the LAWFGS framework, but rather to explore its adaptability across different governance conditions, data systems, and empirical modalities. Each direction reaffirms the framework's foundational premise:

that governance emerges not through fixed rules, but through patterned negotiations of meaning, roles, and context.

5.3. Limitations

While the LAWFGS framework offers novel insights into semantic governance, its empirical and analytical boundaries must be acknowledged. This study is empirically grounded on a specific segment of agricultural water governance in northern Taiwan. Its analytical scope is explicitly limited to periods of escalating water tension and does not extend to routine or baseline governance conditions. The interview sample primarily includes officials and frontline agricultural actors, embedded in local irrigation governance; perspectives from environmental NGOs or civil society stakeholders are not represented. While this reflects the institutional configuration of the region's irrigation governance system, we recognize this limitation and encourage future research that incorporates more diverse actor types and discursive positions. Consequently, the applicability of the LAWFGS model to other sectors, such as urban infrastructure, environmental flows, or multi-use water systems, remains to be tested.

The model is also built based on qualitative methods, using conceptual constructs derived through interpretive coding rather than statistical generalization. While this aligns with the epistemological foundation of SGT, future studies incorporating mixed-method designs could strengthen the model's empirical robustness and broaden its utility.

Importantly, the LAWFGS framework is not intended as a universal typology. Its strength lies in its contextual specificity and modular adaptability. The model offers a relational yet flexible lens to observe how governance unfolds under semantic tensions, institutional ambiguity, and strategic fluidity. Rather than prescribing fixed solutions, the LAWFGS framework enables practitioners and researchers to trace how meanings, roles, and decisions co-evolve in response to shifting conditions. Given that the findings are deeply embedded within Taiwan's semi-centralized water governance architecture and sociopolitical landscape, caution should be exercised when applying the LAWFGS model to jurisdictions with markedly different institutional arrangements or water governance cultures.

Methodologically, to strengthen the model's credibility for potential cross-contextual application, particular care was taken to uphold analytical rigor throughout the qualitative process. Although formal intercoder reliability statistics were not calculated, due to the interpretive emphasis of the coding methodology, several safeguards were implemented. These included independent coding checks and cross-validation of analytical memos to ensure consistency and reflexive coherence. This procedural transparency enhances the trustworthiness of the findings, particularly in studies that address complex and discursively mediated governance dynamics.

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Institutional Review Board Statement: This study was conducted in accordance with the ethical guidelines for social science research at the authors' affiliated university. According to Article 5 of Taiwan's Human Subjects Research Act, IRB approval is required only for studies involving biomedical interventions, high-risk behavioral manipulation, or the collection of personally identifiable information. As this study involved none of these, it is exempt from Institutional Review Board

(IRB) review. All procedures were carried out in compliance with national regulations and the ethical principles set forth in the Declaration of Helsinki (2013 revision).

Informed Consent Statement: All participants provided verbal informed consent prior to participation. Anonymity and confidentiality were assured, and participants were informed of their right to withdraw from the study at any time without consequences.

Data Availability Statement: Data is contained within the article.

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Appendix A

Table A1. Interviewee codes and background information.

Code	Institution/Organization	Position/Identity	Role Attribute Summary
PA1	Agricultural Practitioner	Farm Owner	Grassroots agricultural stakeholder with local knowledge; represents domestic water users' perspective
PA2	Local Irrigation Association	Committee Member	Semi-official policy coordinator, familiar with policy semantics and risk communication
PA3	Technology Industry	Director of Operations	Major industrial water user; highly risk sensitive, uses flexible semantic strategies
PA4	Local Irrigation Association	Senior Advisor	Experienced in central–local interactions; serves as a translator of risk signals
PA5	Local Government Unit	Mid-Level Administrator	Government middle manager in charge of irrigation monitoring and emergency coordination
PA6	Central Government Agency	Senior Executive	Central policymaker overseeing policy design and operational execution
PA7	Village/Community Office	Village Chief	Grassroots administrative actor; language reflects residents' concerns and policy reception
PA8	Irrigation Implementation Unit	Frontline Manager	First-line operator of irrigation zones; conveys operational constraints
PA9	Local Irrigation Unit	Field Supervisor	Mid-level administrator managing local water allocation and coordination
PA10	Local Irrigation Unit	Engineering Officer	Technical staff member; language emphasizes procedures and standard practices
PA11	Agricultural Engineering Institution	Technician	Technical expert in irrigation design and emergency planning; rational and objective in tone
PA12	Local Government Unit	Field Supervisor	Local policy executor; responsible for water rationing orders and compensation policy communication

Note: This table summarizes the key actors interviewed in this study, spanning domestic water users, agricultural water authorities, industrial stakeholders, local government administrators, and central-level policymakers. All identifiers (PA1–PA12) have been anonymized to protect respondent confidentiality. The “Role Attribute Summary” column is based on analytical interpretations of interview content, respondent responsibilities, and discursive tendencies. This coding framework forms the empirical foundation for the subsequent classification of semantic governance patterns and strategic stance typologies.

Table A2. Semantic codes and mapping dimensions using representative raw data.

No.	Initial Code	Source (Raw Data)	Semantic Cue/ Indicator	Semantic Cluster	Actor Strategy Role	Interpretive Flexibility
1	Detecting reservoir fluctuations	PA1: “We monitor the reservoir levels. . . and <u>get a sense of whether this year will be difficult.</u> ”	Early vigilance, not triggering action	Hydrological Sensing and Early Warning	Observer	Conservative Framing
2	Monitoring irrigation anomalies	PA4: “We all know it’s time to save water, but we still <u>wait for formal announcements.</u> ”	Deferral phrasing/postpones action, while acknowledging need	Hydrological Sensing and Early Warning	Observer	Strategic Ambiguity
3	Interpreting climate signals	PA3: “When anticipating water severe, we activated water-saving protocols ahead of official measures, <u>anticipating escalation.</u> ”	Anticipatory narrative cue	Hydrological Sensing and Early Warning	Reframer	Narrative Reframing
4	Applying historical knowledge	PA5: “Water rationing <u>wasn’t our decision</u> , it’s where <u>the system led us.</u> ”	Softens accountability and reframes legitimacy	Temporal Framing and Memory Activation	Translator	Discursive Adjustment
5	Delaying dialogue initiation	PA10: “The directive says to <u>prepare Plan A</u> , but in reality they ask us to <u>follow Plan B.</u> ”	Contradictory directive reference	Semantic Timing and Delay	Negotiator	Strategic Ambiguity
6	Referencing disaster memory	PA8: “Back in 2021, we waited too long and lost three weeks of coordination time. Since then, <u>we always bring up that year during meetings</u> , it reminds everyone what hesitation costs us.”	Retrospective anchoring/reframing presents urgency	Temporal Framing and Memory Activation	Reframer	Narrative Reframing
7	Activating intergenerational awareness	PA2: “We try not to alarm farmers too early, we <u>don’t want panic before it’s necessary.</u> ”	Risk aversion through rhetorical containment	Semantic Timing and Delay	Observer	Conservative Framing
8	Embedding local discourse patterns	PA5: “We don’t call it a drought <u>until there’s official notice</u> , . . . it’s about managing perceptions.”	Postpones recognition of crisis/discursive modulation of institutional severity	Semantic Timing and Delay	Translator	Strategic Ambiguity
9	Mediating regional contextual divergence	PA6: “ <u>Back in 2009</u> , we delayed too long. . . <u>this time we act fast</u> before it gets worse.”	Adaptive contrast/frames a shift in behavior	Temporal Framing and Memory Activation	Reframer	Discursive Adjustment

Table A2. Cont.

No.	Initial Code	Source (Raw Data)	Semantic Cue/ Indicator	Semantic Cluster	Actor Strategy Role	Interpretive Flexibility
10	Defining role functions	PA12: “When the command center activates, our role <u>becomes strictly logistical.</u> ”	Redefinition of scope under operational realignment	Role Realignment and Adjustment	Observer	Discursive Adjustment
11	Accepting community role expectations	PA9: “When the upstream regions start cutting supply, <u>we know it’s coming soon,</u> even before the order.”	Anticipatory normalization	Role Realignment and Adjustment	Observer	Conservative Framing
12	Interpreting institutional boundaries	PA10: “We often receive <u>guidelines that seem straightforward,</u> but once we consult with the regional office, their interpretation shifts the responsibility back to us.”	Shifting accountability	Role Realignment and Adjustment	Translator	Strategic Ambiguity
13	Flexibly shifting task focus	PA8: “It’s not delay, it’s <u>adaptive pacing.</u> We’re <u>aligning with evolving priorities.</u> ”	Role calibration under uncertainty	Semantic Timing and Delay	Negotiator	Discursive Adjustment
14	Coordinating cross-level accountability	PA2: “It’s climate change. You <u>can’t blame any agency for this anymore.</u> ”	Shifting focus to external cause	Role Realignment and Adjustment	Negotiator	Narrative Reframing
15	Blurring key phrases	PA8: “We only <u>follow orders.</u> The real decisions come from the top.”	Blurring local accountability	Role-Ambiguity and Semantic Fracture	Observer	Strategic Ambiguity
16	Reframing risk vocabulary	PA9: “We <u>frame it in technical terms,</u> it’s too complex to explain in simple terms.”	Shifting semantic accessibility	Semantic Framing and Rearticulation	Translator	Discursive Adjustment
17	Deploying preventive narratives	PA3: “ <u>Why should we act if others aren’t cutting first?</u> <u>We wait for equity.</u> ”	Peer reference delay framing	Semantic Framing and Rearticulation	Negotiator	Strategic Ambiguity
18	Deferring decision language	PA9: “We mediate between farmers and agencies, <u>we don’t take sides.</u> ”	Neutral brokerage	Semantic Framing and Rearticulation	Translator	Strategic Ambiguity
19	Substituting policy framing language	PA3: “There’s only so much <u>water in the reservoir,</u> it’s not a governance issue.”	Resource–object emphasis	Semantic Framing and Rearticulation	Observer	Conservative Framing
20	Buffering contextual tension	PA2: “We have <u>no clarity,</u> the water bureau and our office <u>don’t align.</u> ”	Inter-institutional misalignment	Role Ambiguity and Semantic Fracture	Translator	Strategic Ambiguity

Table A2. Cont.

No.	Initial Code	Source (Raw Data)	Semantic Cue/ Indicator	Semantic Cluster	Actor Strategy Role	Interpretive Flexibility
21	Softening policy rhetoric	PA7: “Every few years we hit this level, it’s nothing new, just <u>part of the cycle</u> .”	Routine normalization	Temporal Framing and Memory Activation	Observer	Conservative Framing
22	Expanding ambiguity tolerance	PA2: “No one really knows how long it will last, so we’re just waiting it out.”	Duration uncertainty	Semantic Timing and Delay	Observer	Strategic Ambiguity
23	Rewriting avoidance discourse	PA5: “We’ll <u>act</u> when farmers start calling, it hasn’t reached that point yet.”	Reactive trigger framing	Semantic Framing and Rearticulation	Observer	Strategic Ambiguity
24	Synchronizing dual-layered semantic logic	PA9: “We announce <u>plans</u> , but execution depends on many variables, <u>it’s symbolic</u> , really.”	Implementation–narrative decoupling	Semantic Framing and Rearticulation	Translator	Discursive Adjustment
25	Citing external normative endorsement	PA6: “Yes, the directives shift, <u>but we interpret them as adapting with us</u> .”	Directive reinterpretation	Role Ambiguity and Semantic Fracture	Negotiator	Narrative Reframing
26	Aligning with superior policy discourse	PA6: “Everyone is aligned that <u>we need time to assess</u> . It’s not stalling.”	Delay as assessment logic	Semantic Timing and Delay	Translator	Strategic Ambiguity
27	Evoking historical legitimacy narratives	PA8: “ <u>We can’t act until they decide</u> , the upstream bureaus set the tone.”	Chain-of-command deference	Temporal Framing and Memory Activation	Observer	Conservative Framing
28	Reinforcing departmental logic justification	PA2: “Last month we <u>had decent rain</u> . No need to panic just yet.”	Historical reassurance	Temporal Framing and Memory Activation	Observer	Conservative Framing
29	Merging legal emotional and socio-emotional reasoning	PA2: “Every year, same paperwork, same thresholds, <u>it’s all protocol</u> .”	Procedural fatalism	Role Ambiguity and Semantic Fracture	Observer	Conservative Framing
30	Misjudging hydrological risk	PA1: “They <u>didn’t specify exactly what’s meant</u> by ‘tight supply’, so we’re cautious.”	Terminology vagueness	Semantic Timing and Delay	Observer	Conservative Framing

Table A2. Cont.

No.	Initial Code	Source (Raw Data)	Semantic Cue/ Indicator	Semantic Cluster	Actor Strategy Role	Interpretive Flexibility
31	Using inconsistent terminology	PA8: “We’re <u>moving fast</u> , and that <u>leads to gaps</u> , but we <u>catch up</u> .”	Speed–clarity trade-off	Semantic Timing and Delay	Negotiator	Discursive Adjustment
32	Misplacing role expectations	PA7: “We’ve been <u>through worse</u> , people will <u>adjust again</u> .”	Resilience historicization	Temporal Framing and Memory Activation	Observer	Conservative Framing
33	Delaying communication	PA12: “We <u>follow national water guidance</u> , no local improvisation here.”	Centralized deference	Role-Ambiguity and Semantic Fracture	Observer	Conservative Framing
34	Avoiding direct engagement	PA12: “ <u>Instead of ‘cutting water’</u> , we say ‘ <u>adaptive scheduling</u> ’.”	Euphemistic substitution	Semantic Framing and Rearticulation	Translator	Discursive Adjustment
35	Evading institutional responsibility	PA6: “ <u>Last time we hesitated and paid the price</u> , this round, we’re better prepared.”	Past error activation	Semantic Timing and Delay	Reframer	Narrative Reframing
36	Reacting passively to media pressure	PA10: “When <u>pressure hits</u> , language starts slipping, it’s <u>normal in chaos</u> .”	Stress-induced drift	Semantic Framing and Rearticulation	Observer	Strategic Ambiguity

Note: This table integrates the 36 initial codes derived from interview transcripts, each linked to a semantic cluster, actor strategy role, and interpretive flexibility types. Representative raw data excerpts illustrate the discursive grounding of each code. The “Semantic Cue/Indicator” column provides an interpretive anchor drawn directly from the raw data (underlined phrases drawn from the raw data), offering a transparent bridge between empirical language and theoretical mapping. Semantic clusters reflect recurring discursive patterns, while the final two columns trace the alignment of each code with the LAWFGS model’s axial components: actor strategy roles and forms of interpretive flexibility. This table operationalizes semantic positioning through interpretively grounded cues, in line with SGT’s methodological emphasis on contextual meaning making and relational theorization.

Table A3. Operational definitions and analytical constructs in the LAWFGS framework.

Construct	Theoretical Definition	Operational Construct	Indicative Expressions or Data Markers
1. Semantic Flexibility of Governance Context	Refers to the degree of interpretive space and strategic adjustment that actors demonstrate in response to hydrological changes, policy semantics, and institutional signals. This flexibility reflects the openness in their language use and their ability to navigate uncertainty through strategic ambiguity.	The actor's capacity to deploy ambiguous or open-ended language to defer meaning, shift responsibility, or facilitate negotiations within institutional contexts.	Frequency and placement of phrases such as "case-by-case basis," "under discussion," "subject to adjustment," "according to regional conditions," and "flexible implementation."
2. Role Shifting Frequency	Refers to the frequency and flexibility with which actors adjust their governance roles in response to different situational demands, indicating shifts in participatory position or strategic identity (e.g., from implementer to advocate or coordinator).	The degree to which actors modify their participatory stance and functional role in accordance with evolving governance conditions.	Self-referential shifts in interviews (e.g., "Our office. . ." → "From a resident's perspective. . ."), expressions of blurred role responsibilities, and narrative transitions marking contextual shifts.
3. Governance Configuration Shifts	Refers to the dynamic restructuring of governance arrangements, such as resource allocation, role boundaries, and coordination mechanisms, in response to institutional pressures and environmental variability. This axis highlights the contextual reassembly of governance mechanisms.	How governance authority, resource distribution, and operational procedures are dynamically adjusted and reconfigured during multi-actor interactions based on contextual demands.	Recurring references to "changes in decision-making participants," "revisions to irrigation rules," or "realignment of interdepartmental coordination roles," as identified in discourse patterns.

Note: This table specifies the coding logic used to identify semantic patterns and role transitions in the empirical data. The three analytical constructs, namely semantic flexibility of governance context, role shifting frequency, and governance configuration shifts, correspond, respectively, to the tri-axial mapping of the LAWFGS framework: interpretive flexibility, actor strategy roles, and governance contexts. Terminological differentiation is used to distinguish the empirical coding layer from the conceptual model, allowing for clearer delineation between data interpretation and theoretical generalization. Each construct includes a theoretical definition, operational description, and typical expressions used in the coding process.

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