

Too Much Bureaucracy, Too Little Time: A Case Study in Using the Agent Based Approach to Analyze the Efficacy of the Environmental Quality Incentive Program

Kyle Karnuta^{a,b,c,@}

^aCornell University

^bJeb E. Brooks School of Public Policy

^cCornell Institute for Public Affairs

@ email: kpk59@cornell.edu

ABSTRACT: The climate crisis is worsening, and agricultural extraction is exacerbating the effects of these changes. The U.S. Congress has authorized conservation-minded programs like the Environmental Quality Incentives Program (EQIP) to mitigate the impacts that agriculture has on the environment, yet the climate and land-health crises persist. A Systems Thinking-focused Agent Based Approach (ABA) reveals the system of EQIP perpetuates a culture of competition and conflict that stifles innovation. Remediating the wicked problems that persist in the EQIP system may be critical to creating a culture of sustainable-minded agriculture that this country needs to fight the larger battle against climate change.

Keywords: EQIP | USDA | NRCS | agriculture policy | systems thinking | ABA

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Introduction: Solving Wicked Problems

AGRICULTURE IS A FUNDAMENTAL reality of modern human life, necessary for producing life-sustaining nourishment through extraction. For all its necessity, agriculture poses a serious challenge to the health of the environment that sustains it and, as a result, a challenge to the people who depend on that environment. The basic human need for food and a clean, healthy environment creates an inherent contradiction: While the need for food persists, conventional agricultural extraction in the U.S. is polluting our land, our water, and our air.

This issue could be called a “wicked problem,” seemingly too big and too complex to solve despite its critical importance¹. Congress first authorized the Environmental Quality Incentives Program (EQIP) in 1996 as one solution to this wicked problem². While EQIP is authorized and funded by Congress it is administered by the Natural Resources Conservation Service (NRCS) department within the United States Department of Agriculture (USDA). EQIP’s stated purpose is to provide “financial and technical assistance to agricultural producers” to help producers, or farmers, mitigate “natural resource concerns,” “deliver environmental benefits,” and respond to regulations³. However, agroecological devastation

¹ D Cabrera and L Cabrera, *Systems Thinking Made Simple: New Hope for Solving Wicked Problems in a Complex World*. Odyssean Press, Odyssean Press, Ithaca, 2015

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continues across the U.S.⁴. It turns out that EQIP itself, as a system, has its own wicked problems. Systems Thinking provides a lens through which to more clearly understand EQIP and identify solutions to those problems.

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At first glance, many wicked problems appear too complicated to attempt to solve. In a survey of Cornell University faculty, some of the brightest minds on the planet, researchers found that participants identified many of the world's most pressing problems as being highly infeasible to solve⁵. These important/infeasible issues largely dealt with "human nature and ideological conflict," including "political hot topics"⁶. Participants perceived these issues as being too complicated to easily solve, and therefore, dismally, perhaps not worth the effort of attempting to solve. But the fourth wave of Systems Thinking provides a universal theory that explicates the distinction between complication and complexity⁷. A complex system is adaptive - the components of the system will respond to changes to their environment or state of being. A system that is complicated may have many parts organized by the laws of physics and biology and time, but it is not adaptive⁸. This theory of System Thinking can therefore be leveraged to assess and provide recommendations for improving the system that is EQIP.

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Methods: A Structure for Analysis

Mental Models and Understanding the System

TOO OFTEN, the solutions to wicked problems remain out of reach as a result of our thinking. The obsession with information and control of that information dominates our problem solving. But how information is structured is just as important as the information itself. That structure is often sidelined and forgotten to such a degree that problems remain unsolved⁹.

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The relationship between information and thinking (or structure) is illustrated in the following formula borrowed from Cabrera and Cabrera¹⁰, page 72:

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$$\text{Mental model (M)} = \text{information (i)} + \text{structure (s)}$$

The use and understanding of information (data, content) and structure (thinking, organization, cognition) informs our mental models about any problem, system, or reality¹¹. These mental models are our understanding of the world, or of a particular problem. They represent the meaning we derive from a situation¹². Our

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unique understanding of the world informs how we respond to it, and if attention is only given to the information, rather than both information and structure, our mental models cannot give us an accurate sense of what the challenges we face are really all about.

Fundamentally, this project is an investigation of EQIP as a system with the goal of aligning this author's current mental model with reality in order to offer recommendations for improving the system. Moving forward, this process will be referred to as "understanding the system" rather than "solving the problem" in an effort to mitigate any bias that the term "problem solving" introduces to the process¹³. ¹³ 7

Leveraging an Agent Based Approach (ABA)

AT THE HEART OF THE THEORY of Systems Thinking is the breakthrough identification of Complex Adaptive Systems, or CAS. Adaptive systems respond to changes in their environment at a macro-level as a result of countless agents within the system following simple rules:

Agents x Simple Rules (local interaction rules) = Emergent (system) Behavior ¹⁴ ¹⁴ 7

To change a system's emergent behavior, either the agents or the simple rules must be manipulated or influenced. Simple rules are so effective because the countless individual agents within the system are deeply, evolutionary, or culturally connected to those rules. Fundamentally changing these rules may be a colossal task. However, each agent interacts with these rules in unique ways, and those individual interactions aggregate to create the system behavior. Influencing the agents and their interaction with the simple rules offers the most opportunity to influence change within the system overall¹⁵. ¹⁵ 7

Determining that a system (in this case, the system of EQIP) is a CAS is the first step in addressing wicked problems within or resulting from that system. Agent-Based Modeling (ABM) then offers a framework for understanding and assessing that CAS. ABM is a "computational model" that organizes the elements of a CAS and simulates different outcomes of emergent behavior based on changes to those elements¹⁶. ABM is a highly specific framework dependent on an abundance of "hard" data and the "coding competency" of the modeler¹⁷. The application of ABM is also limited for systems involving a high degree of "human or animate agents." This study of EQIP lacks significant hard data and coding competency, and the ¹⁶ 7 ¹⁷ 7

system of EQIP itself is largely driven by the behavior of human agents. Therefore, ABM is not the most practical framework for this analysis.

Recognizing the need for an analytical framework to model policy-level systems, Drs. Derek and Laura Cabrera developed the Agent Based Approach (ABA) as an alternative to ABM¹⁸. ABA is designed to serve a similar function as ABM but in scenarios where ABM is not feasible, as with this assessment of EQIP. Analysis and recommendations for improving the system are the expected output of ABA.

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Steps to an Agent Based Approach (ABA)

ABA ILLUMINATES the true purpose of a system and lays a foundation for changing the outcomes of that system through the following steps:

Step 1: DSRP Analysis and the Mapping of a System

THE FIRST STEP to addressing the wicked problem at hand is understanding the system at the heart of that problem. Wicked problems can only be solved by aligning the mental models held by problem solvers with reality. DSRP patterns and elements, combined with Systems Mapping, provide the structural framework for understanding a system when combined with information about that system¹⁹. These DSRP patterns and elements, presented by Mulyono et. al and developed by Derek Cabrera, are as follows:

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Patterns	Elements
Distinctions (<i>D</i>)	identity (<i>i</i>) ↔ other (<i>o</i>)
Systems (<i>S</i>)	part (<i>p</i>) ↔ whole (<i>w</i>)
Relationships (<i>R</i>)	action (<i>a</i>) ↔ reaction (<i>r</i>)
Perspectives (<i>P</i>)	point (<i>ρ</i>) ↔ view (<i>v</i>)

Table 1: DSRP Patterns and Respective Elements, and Their Coimplied Relationships

DSRP patterns and elements comprise “simple rules” for understanding, especially for understanding Complex Adaptive Systems (CAS) which follow their own underlying simple rules²⁰. If wicked problems are simply ultra-complex CAS, DSRP can be leveraged to break down the underlying systems within those wicked problems to aid in comprehension and the building of accurate mental models²¹.

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Understanding the system that is EQIP begins with making distinctions, starting with identities. The more actors, the more complex a system will be²². Dio (distinctions - identities and others)

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gives an initial sense of this complexity. Spw (systems - parts and wholes) gives more meaning to these identity distinctions by grouping parts and wholes. Each whole is a system in itself, and may need extensive analysis to better understand the system at large. Rar (relationships - actions and reactions) relates these distinctions and part-whole systems. The Systems Map can convey even deeper meaning when Dio, Spw, and Rar are viewed through different lenses. Ppv (perspectives - points and views) provides a structure for those lenses.

Elements of DSRP can be configured in Systems Maps to aid visualization and understanding of a system. The use of cognitive jigs opens even deeper pathways to explore the meaning between structural elements. Cognitive jigs combine elements of DSRP on Systems Maps to reliably and accurately represent some of the most dense features of a system's structure²³. P-Circles, Sub-Perspectives, Part-Parties, Barbells, RDS (relate, distinguish, and systematize) Barbells, and R-Channels can be employed to tease out some of the more entrenched structures of any system²⁴.

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DSRP and cognitive jigs provide clarity even when they are not present in a System Map. Given the coimplied nature of all DSRP elements (for example, where Di is present, Do must also be present), Systems hide their wicked problems through their overdependence on information and norms around that information. "Structural predictions" can unlock a system's deeper truth by uncovering structures that the information within the system is trying to hide²⁵. Leveraging the theory of coimplication, a Systems Thinker must simply ask: if there is a Di, what is the Do? If there is a Ra, what is the Rr? And so on until they are satisfied.

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Now pause. Before moving ahead to step 2, a critical re-grounding in reality is necessary. As previously stated, the goal of systems thinking and this Agent Based Approach is to better align a mental model with reality. DSRP analysis and Systems Mapping should refine that mental model, but is that mental model actually more representative of reality? Now is the time to reflect and consult expertise to provide feedback on this new understanding of reality. Does the DSRP analysis and Systems Map reflect the real world more accurately than the previous mental model? Continue to step 2. If it does not, dive back into the DSRP analysis. This process, referred to as the ST (systems thinking) Loop, should be repeated throughout the various ABA stages²⁶.

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Step 2: POSIWID and CAS Analysis



Figure 1: ST Loop

ONCE DSRP STRUCTURAL ELEMENTS are identified and mapped, two straightforward analyses follow. A POSIWID analysis, or the “Purpose of a System is What it Does” analysis, transforms the insights gained from the DSRP Systems Map into a vision for changing the system²⁷. Systems Mapping should clearly reveal agent behavior within the system and what outcomes arise as a result of that behavior. This is the “purpose of a system is what it does;” not what a system is supposed to do, or is stated to do on its website, or what it promises to do in a press release: what it actually does. This POSIWID might not match the stated mission, or the vision that a researcher has for what a system could accomplish. Therefore, there could be a distinction between the current-state POSIWID and the ideal, future-state POSIWID. Both POSIWIDs need to be identified and the root difference between them articulated.

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The CAS Analysis simply articulates what by now should already be understood: which agents are key players in the system, what simple rules do they follow, and what behavior results at the system level because of that interaction between agents and simple rules? These formulas clarify this principle:

CAS = agents x local interaction rules → self-organization/ collective dynamics → emergent properties

Alternatively: agents x simple rules = emergent behavior

Step 3: Rubric and Recommendations

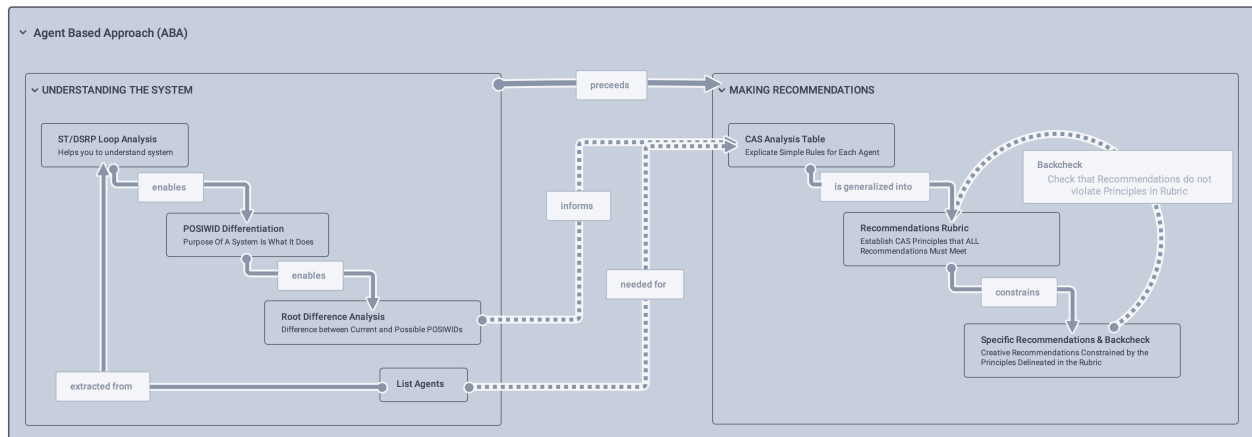
WITH A CLEAR VISION in mind for a future-state POSIWID and an understanding of the agents and agent behavior that contribute to the system, recommendations can be made to move the system's emergent behavior from the current-state POSIWID to the future-state POSIWID. Before recommendations can be made, however, recall that bias is the fundamental and pervasive pest of all problem solving attempts. Setting guardrails, or a recommendation rubric, ensures that bias is kept at bay and that any recommendations avoid the fundamental issues that currently plague the system. The root difference between the current-state and future-state POSIWIDs forms the foundation of this rubric.

From here, recommendations can be made. These recommendations should impact the system's agents and their interactions with the system's simple rules, if these areas create "the greatest leverage points" within the CAS²⁸. So long as no recommendation breaks any of the rules outlined in the rubric, these recommendations can be as wild and big-picture as the imagination can muster. By this point, the researcher will be so ingrained in the system, will understand not just its information but its true structure, that they can be confident in their ability to offer suggestions.

Taken together, ABA is a system in and of itself which, when mapped, can be outlined as follows:

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Figure 2: Agent Based Approach as a System



Results

EQIP IS A POLICY and program authorized by the United States Congress to help mitigate the wicked problems of environmental

degradation and the effects of climate change caused by agricultural production in the U.S. Through ABA, EQIP's own wicked problems are illuminated with the intention of offering recommendations to solve those problems.

These results are the outcome of five different rounds of ST Loops. The first map used data from official USDA and NRCS sources. This limited and biased data resulted in a map that overemphasized process and hierarchical relationships. Information on EQIP's history and purpose was difficult to procure, resulting in a broken relationship (Rar) between the historical political context that led to EQIP's authorization and the current agroecological reality that necessitates programs like EQIP. While the process of applying for EQIP funding was clear (a system of relationships, SoR), the relationships between key agents in the EQIP system (Congressional authorizers, executive agencies like the USDA, and NRCS and its local offices) was not. Systems Thinking feedback from our TA, Angel Ortega Gonzalez (ST Loop 1), led to a complete reformatting of the map. This new format included structural predictions: If the action (Ra) initiated by Congress to authorize EQIP is clear, where is the reaction (Rr)? If farmers and NRCS administrators are influenced by external forces (Dio, Rar), how do those forces interact (Rar, SoRs, Part-Parties)? How do farmers interact with NRCS influences, and vice versa (Do, Rar)? These are just some examples of the structural predictions that led to the final, more robust System Map. Researching more diverse sources filled these gaps (ST Loop 2).

Then it was time to check this updated mental model with reality. A farmer from Atlanta, GA clarified that farmers are largely aware of EQIP and find this program and NRCS useful (ST Loop 3). This reality countered a major assumption of the initial mental model, in which farmers underutilized funding because of a lack of awareness. A conversation with the local NRCS representative in Ithaca, NY reiterated this close relationship between farmers and NRCS offices, but challenged many of the remaining assumptions of the nascent mental model (ST Loop 4). This ST Loop uncovered true structural limitations of the EQIP system. A final round of ST Loops (aggregated as ST Loop 5) with Systems Thinking experts (a student from our class and another conversation during office hours with Angel Ortega Gonzalez) contributed to the development of the final, compressed Systems Map and a more streamlined approach to communicating the most updated mental model of the EQIP system.

DSRP Analysis of EQIP System

Figure 3: Iterations of EQIP System Mapping



THE DSRP ANALYSIS OF EQIP began with setting several framing and stopping, or “fropping,” rules to direct and constrain this analysis. The topic of interest was the system of federally funded domestic environmental sustainability programs applied to the agriculture industry in the U.S., specifically those incentivizing actors within the agriculture sector to operate more sustainably, using EQIP as a case study. The goal was to better understand EQIP as a system to assess the root causes of any limits to the program’s efficacy in order to make policy recommendations to improve that efficacy. The investigation would be constructed with agriculture policy and Systems Thinking experts in mind, and would need to be completed by December 18, 2021. Knowledge would be gleaned from the Congressional Research Service, reputable news sources, and industry-specific newsletters, while expert feedback would be ascertained from local NRCS administrators, farmers, and our Systems Thinking TA. Additional rules maintained that Plectica would be the main Systems Mapping tool and ST Loops must be completed at least three times.

The final Systems Map reveals three key regions: the high-level federal system, the high-level system of interactions between farmers and their local NRCS offices, and a linear flow of the EQIP application process and resulting POSIWID. The reality illustrated in these three regions is compressed in this single map (Figure 4) and is the result of each ST Loop iteration.

The final Systems Map, included here as Figures 4 - 7, reveals a system dense with relationships (Rar). Action (Ra) is the name of the game in the EQIP system, with the authorization of EQIP from Congress triggering a waterfall of subsequent actions (Ras) ending with the Rar between local NRCS offices and local farmers. A significantly weaker chain of reactions (Rrs) returns limited amounts of information from local offices to NRCS, and subsequently less and less information moving from NRCS to the USDA, and from the USDA to Congress. With this limited information, Congress initiates yet more Ra through the system. No meaningful, direct relationship

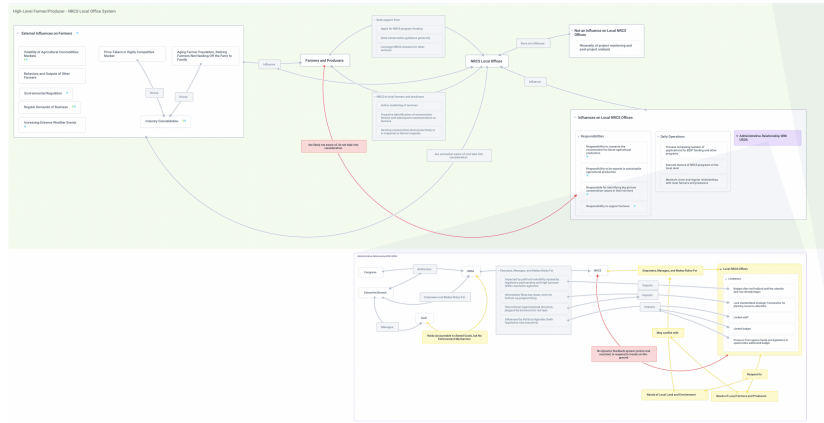


Figure 5: High-Level System of Interactions Between Farmers and Local NRCS Offices with Pop-Out of Local NRCS Offices System of Interactions with USDA and NRCS

As important as each influence (Di) is on the system, what does not influence behavior (Do) is also critical to understand. While NRCS offices are heavily influenced by pressures from USDA executives and completing a checklist of daily operations and responsibilities (Di), they are not influenced by the need to monitor or assess the efficacy of their programs (Do).

Further, each influence (Di) is both a part of and comprises larger systems (Spw). The external influences on farmers are relatively straightforward with regards to their impact on the system of EQIP and relate to each other in a Part-Party. By contrast, the system of influences acting upon local NRCS offices is extremely dynamic. This Spw gives way to a Part-Party/ System of Relationships (SoR) depicting the influence of the USDA on local NRCS offices. R-Channels within this Part-Party illustrate how the relationship between the USDA and NRCS directly impacts the capacity of local NRCS offices.

Zooming out provides a deeper analysis of that relationship between local NRCS offices and the USDA. Clearly, EQIP itself is a system within a system (Spw). This DSRP analysis of EQIP at the federal level reveals four areas of interest. First, while Congress initiates action (Ra) by authorizing the USDA and, therefore, the NRCS and EQIP, there is no direct reaction (Rr) from the USDA back to Congress in the form of monitoring or reports on the efficacy of EQIP. Similarly, while NRCS creates comprehensive conservation plans for farmers, there is no direct reaction (Rr) providing NRCS with a feedback loop to better inform decisions. Second, the structure of the federal Executive Agencies is such that multiple departments within the Executive Branch (Spw) are concerned with conservation and yet have no structural framework (Rar) for collaboration. Third, NRCS is responsible for executing more than 39 programs (Di and

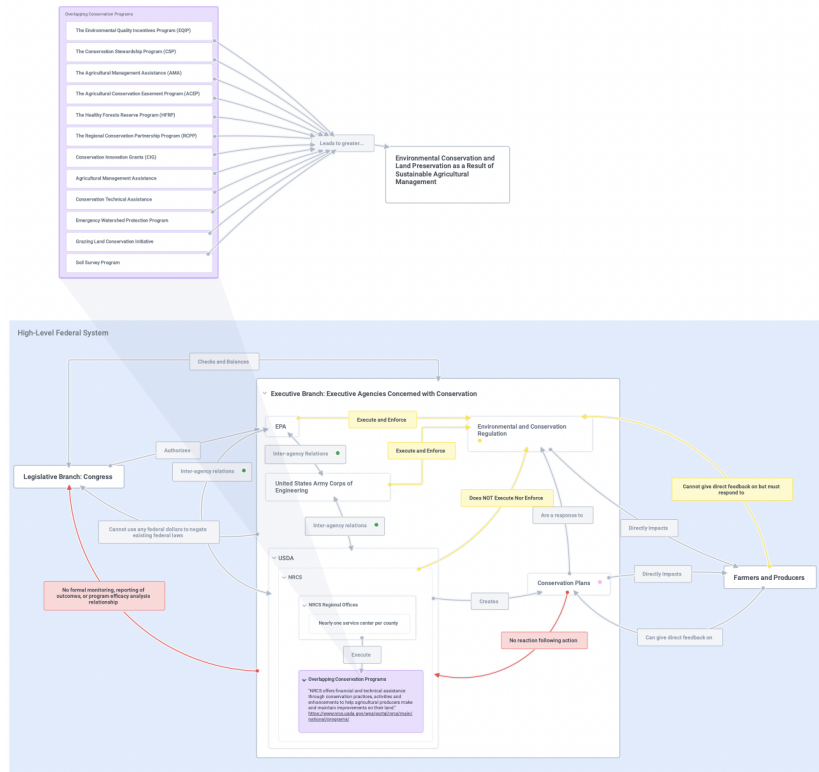


Figure 6: High-Level Federal System with Pop-Out of NRCS Programs

Sp) and many of these programs overlap in mission and scope. Twelve of these programs are included in this map to illustrate this. Fourth and finally, farmers exist, structurally, outside of the system of interactions between Congress, Executive Agencies, and the NRCS. No relevant relationship (Rar) exists between farmers as a group and Congress.

Importantly, note that no Systems Map was created to illustrate the interactions between individual farmers and NRCS offices, nor interactions between each local NRCS office. Service centers exist in nearly every county across the U.S. but no formal relationship exists on an individual, office-to-office level. There are no systems to map. Therefore, while “NRCS Regional Offices” or “NRCS Local Offices” are included as distinctions (Di) in the map, this identity is not a monolith.

POSIWID Analysis

THE SYSTEMS MAP illuminates the strength and scope of influences acting on the agents within the EQIP system. Those influences, in

turn, impact each agents' behaviors (interactions with simple rules leading to emergent behavior). The behaviors of both NRCS offices and farmers are initiated by environmental degradation or crisis. The capacities (RD and Spw) of both farmers and NRCS offices, which are influenced by the extent of external forces acting on them, create the POSIWID.

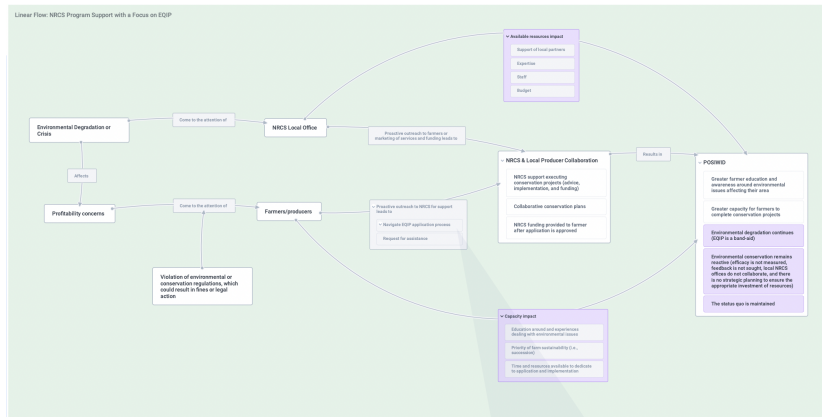


Figure 7: Linear Chain of Events Culminating in NRCS Collaboration with Local Farmers and Eventual POSIWID

The full POSIWID analysis for this system is outlined here:

Current POSIWID	Future POSIWID	Root Difference
The system of EQIP is exceptionally well designed and good at its purpose of increasing local farmer awareness of environmental issues and their capacity to complete conservation projects while ensuring the continuation of environmental degradation linked to agriculture and maintaining the status quo.	The system of EQIP is exceptionally well designed and good at its purpose of decreasing environmental degradation linked to agriculture, empowering farmers and producers to build new and rebuild existing agricultural systems with environmental sustainability as a foundational goal, motivating producers to initiate more sustainability projects, and increasing the number of small and medium farms.	At its core, POSIWID difference is: 1. Profit-centered vs environmentally-centered. 2. Obsessed with efficiency vs concerned with quality and efficacy. 3. Short-term vs long-term. 4. Administrative vs innovative. 5. Reactive vs proactive.

Table 2: POSIWID Analysis

CAS Analysis

EQIP's AGENTS, the simple rules they follow, and the emergent behavior at the system level are delineated in the below table. This understanding of the agents, their simple rules, and emergent behavior is the result of ST Loop 2 and ST Loop 4.

List of Salient Agents	Current Simple Rules	Current System Level Behavior
Farmers (producers)	1. Defer to economic systems - cost of inputs, pricing, ag futures markets, export/ global market. 2. Defer to legal regulations. 3. Land health as an asset, not an ideology.	1. Farmers contact NRCS offices when they see an economic opportunity or when an environmental crisis or regulation demands action. 2. Farming practices continue to degrade land in the macro, impacting human health and ag viability in the long-term and “downstream” (Philpott, 2021). 3. Lack of a sense of urgency around conservation practices.
Local/state-level NRCS administrative offices	1. Receive authorization parameters and budget/resources from NRCS via USDA and Congress. 2. Identify conservation issues in local area. 3. Initiate outreach and marketing of services to local farmers in response to those issues. 4. Intake applications. 5. Rank applications without consistent strategy. 6. Select funding and support recipients quickly. 7. Do not track or monitor programs; do not initiate feedback cycle with USDA. 8. Do not collaborate with other NRCS offices.	1. Bureaucracy reigns. 2. Lack of innovation. 3. Backlog of un-met EQIP applications (Stubbs, 2011). 4. Funding remains relatively stagnant (NRCS, 2020). 5. Uncertain of impact of EQIP (Stubbs, 2011). 6. No sense of urgency or culture built around the mission of EQIP.
Federal-level policymakers	1. Increase political polarization for personal gain (Mettler, 2016). 2. Fundraise. 3. Build coalitions. 4. Turn any accomplishments into campaign-ready storytelling. 5. Do not follow up with USDA or NRCS regarding program efficacy (GAO, 2017). 6. Fund EQIP but not at authorized levels (Stubbs, 2011).	1. Political corruption. 2. Budgets and authorizations are not finalized by deadline (DeSilver, 2018). 3. EQIP projects becoming larger in same/fewer hands (Stubbs, 2011). 4. Funding remains relatively stagnant (NRCS, 2020). 5. No sense of urgency or culture built around the mission of EQIP.
Federal-level executives (USDA/ NRCS)	1. Process Congressional authorization when it is convenient. 2. Defer all execution and administration to local NRCS offices. 3. Do not monitor program efficacy or request feedback from local NRCS offices (GAO, 2017). 4. Do not encourage or facilitate collaboration between NRCS offices. 5. Do not collaborate with other executive agencies with shared goals (Kettl, 2021). 6. Request program continuity (budget) from Congress each year (Kettl, 2021).	1. Budgets and authorizations are not communicated with urgency. 2. EQIP application backlog (Stubbs, 2011). 3. EQIP applications and NRCS projects are not innovative. 4. EQIP remains funded, but funding is relatively stagnant (NRCS, 2020). 5. Competitive work environments.
Environmental Quality Incentives Program	1. Maintain funding. 2. Maintain staff. 3. Maintain political relevance. 4. Deprioritize impact reporting and limit requests for funding increases.	1. Take advantage of recent sustainability trends to continue self-preservation. 2. Remain “under-the-radar,” continue the status quo.

Table 3: CAS Analysis

Rubric and Recommendations

THE RECOMMENDATION RUBRIC takes the structural realities of the EQIP system into consideration, ensuring the subsequent recommendations can practically realign the current-state POSIWID with the future-state POSIWID:

Recommendation Rubric

No specific recommendation should violate these rules:

1. Cannot require changing the entire system at once, i.e., require buy-in and execution from more than two agents at once.
2. Cannot contradict or undercut the mission of any other single recommendation.
3. Cannot create more administrative work for existing EQIP field staff (net).
4. Cannot make it harder for farmers to engage with NRCS offices.
5. Cannot perpetuate an “extractive” mindset among administrators or producers.
6. Must be enforceable.
7. **Must encourage innovation.**
8. **Must be proactive rather than reactive.**

Specific Recommendations

1. Intervention/Recommendation 1: Consolidate external-facing messaging regarding NRCS field programs, ensuring simple, mission-centered messaging between NRCS and producers.
2. Intervention/Recommendation 2: Initiate collaboration, ideation, and selection of streamlined strategic plans through NRCS office-level newsletter, annual conferences, and awards recognizing top performing offices.
3. Intervention/Recommendation 3: Require one “tentpole” initiative per NRCS office per year based on environmental priorities determined by that office.
4. USDA must collaborate with GAO to define measurable goals for NRCS and EQIP, and must collaborate on monitoring the impacts and efficacy of programs like EQIP.

Discussion

THIS INVESTIGATION of the EQIP system began as a simple endeavor to truly understand the system. As a result of this investigation, a clear picture of the wicked problem within EQIP. This discussion articulates that wicked problem and the commensurate recommendations. This investigation also began with the intention of identifying methods to reshape the agriculture industry in the U.S. through possible changes made to the EQIP system. This initial vision was misguided. A close reading of the EQIP system reveals that EQIP never intended to rebuild the current agricultural industry into a truly sustainable system. However, the EQIP system can be tweaked to create a stronger national culture of sustainable agriculture that will be necessary for a true overhaul of the larger system to ever be possible.

DSRP Analysis of the System

THE EQIP SYSTEM is plagued by too many distinctions and unequal relationships. Local NRCS offices must contend with an uncountable number of environmental issues in their area, an uncountable number of local farmers, and market and administer more than 39 programs. A collection of distinct (Di) external expectations and stakeholders, many of them Spws and SoRs themselves, influence the capacity and behaviors of NRCS office workers and farmers, resulting in an unpredictable and potentially volatile relationship between NRCS offices and farmers at the local level.

Meanwhile, the relationships that exist between each of these numerous key agents and the distinctions that affect them are not balanced. The actions (Ra) initiated by Congress are not reciprocated with commensurate reactions (Rr). This map reflects what many American political scientists have shown in their research: that federal government programs notoriously lack cultures emphasizing strategic planning and enforcement mechanisms to ensure this planning occurs²⁹. Strategic planning is only possible in the presence of insights and feedback, but no feedback reaction relationship (Rr) exists within this system. The “Administrative” and “Conservationist” perspectives (Pv) show that while some action (Ra) is focused on conservation, all reaction (Rr) at the federal level is administrative in nature. The entire approach to conservation through the EQIP system is reactive, not proactive.

This map also makes clear another fundamental theory in political science: competition. Many areas of the map, highlighted in yellow,

represent high likelihoods for conflict as a result of redundancy or weak relationship systems. For example, multiple executive agencies (Di) exist to tackle environmental and conservation issues, but the relationships (Rar) between them are only seen through the “administrative” rather than the “conservationist” perspective (Pv). This system creates a culture of competition which in turn increases animosity between agencies and reduces the likelihood of collaboration and innovation³⁰. The actions (Ra) of some executive agencies, like EPA and the U.S. Army Corps of Engineers, largely in the form of conservation regulation directly impact farmers without needing authorization or input from the USDA or NRCS. Without a feedback loop between agencies and farmers, NRCS authorities and farmers are burdened with the work of reactively building conservation plans in response to regulations rather than building conservation strategies from the start that address the environmental issues that regulations seek to address.

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This competitive mindset impacts the relationships between NRCS offices. Currently, there is no relationship and therefore nothing to map. A lack of collaboration between agencies and between NRCS offices creates a significant roadblock to strengthening the reaction (Rr) relationships within the EQIP system and stymies the innovation that is so critically needed to address our climate crisis.

POSIWID Analysis

AS A RESULT OF THIS overabundance of distinctions and a lack of commensurate relationships (strong Ra and weak Rr), the current POSIWID perpetuates a status quo that ensures the demise in the health of American farmland and contributes to devastating trends in climate change. The most significant differences between the future-state POSIWID and the current-state POSIWID is the current-state’s prioritization of administration over innovation and the current-state’s reactive as opposed to proactive action. The future-state would prioritize innovation and proactive action. These differences are soundly supported by the realities reflected in the Systems Map and DSRP analysis.

CAS Analysis

EQIP’S PRIMARY SYSTEMS ACTORS, or agents, are easily identified through the DSRP analysis and System Mapping. Understanding why they behave as they do is clearly illustrated on the Systems Map,

but this step also required interrogation through research and ST Loops. Data available online through NRCS' own web pages, through the Government Accountability Office (GAO), and sustainable agriculture non-profit/association websites indicate that funding for EQIP has remained stagnant for five years despite a chronic backlog of unaddressed applications for EQIP funding³¹. Political science academia gives clear examples of competition and an open lack of collaboration between federal executive agencies, as well as intensifying political polarization and a distracting "campaign mentality" amongst federal legislators³². Then, there is the simple reality that U.S. land and water health as a result of agricultural extraction are in worse shape than ever³³.

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³² 9; and 12

³³ 4

The previously identified issue with distinctions and relationships again can shed light on the simple rules that system agents follow and their respective impact on emergent behaviors. Farmers must respond to economic motivations first but differences in external influences makes it difficult for NRCS offices to collaborate consistently with farmers. An administrative, competitive, and efficiency-first mindset persists throughout federal executive agencies, especially USDA and NRCS. Congress is too concerned with upcoming campaigns in the short-run to push the USDA to monitor their programs and report on their efficacy in the long-run. And EQIP is just trying to survive. The burden of responsibilities and expectations pushed on local NRCS offices from farmers and the federal system is overwhelming, and the conditions set by the simple rules followed by other agents in the system creates an environment in which local NRCS administrators can only just get the work done. There are no incentives or systems in place to encourage the innovation and strategic investments that are so badly needed as the climate crisis and land degradation worsen.

When multiplied an uncountable number of times, across dozens of NRCS programs and between hundreds of NRCS offices interacting with thousands of American farmers, this system has perpetuated conflict, stagnation, and the increasingly dire environmental impacts of farming.

Rubric and Recommendations

PUTTING EQIP IN THE CONTEXT of the larger system of federal conservation programs from the top and the needs and concerns of farmers at the ground level, it would not be possible for changes to EQIP alone to make a significant difference in the domestic fight to mitigate environmental crises caused by agricultural production.

EQIP is one tiny system that isn't even sure why it exists. It exists largely for its own sake, and as a budget line between Congress and the NRCS. However, changes to some of the agents and their behaviors and interactions with EQIP could result in meaningful changes in attitudes and approaches to sustainable agriculture. Improving EQIP's POSIWID is therefore a worthwhile endeavor.

The rubric is extensive to ensure no recommendations are presented that would result in worse outcomes or perpetuate existing outcomes. The final two rules in the rubric are the most critical: any recommendation to the EQIP system must make the system more innovative and more proactive. With the effects of the climate crisis worsening every year, the agriculture industry can no longer afford to follow the status quo. Farmers and local NRCS administrators, on the whole and based on my conversations with both groups, care deeply about the environment and the sustained health of their local land. But the system needs to account for the many external influences on both agents (largely economic influences on farmers and administrative influences on local NRCS administrators) and both accommodate for those influences and incentivize more innovative conservationist behavior.

Each recommendation gets to the root of this problem. Overall, these recommendations seek to streamline communication between farmers and NRCS administrators to ensure the focus of their collaboration lies on the mission of conservation rather than administrative details. EQIP and many of the 39 other NRCS programs can be consolidated into one program, if not in the budget process then at least in external communication. The recommendations also seek to encourage communication and informative feedback (Rr) back through the federal authorization and empowerment channels to ensure appropriate (a.k.a. increased) resources and funding are made available to local NRCS offices. Collaboration is another objective of these recommendations to increase innovation and strategic planning, again with the ultimate goal of keeping all relationships and perspectives in the EQIP system as focused as possible on conservation. By decreasing the number of distinctions and strengthening the Rr feedback loop, more incentives, strategy, and attention can be focused on the "Conservationist" perspective before it is too late to conserve anything at all³⁴.

³⁴ 13

Appendix

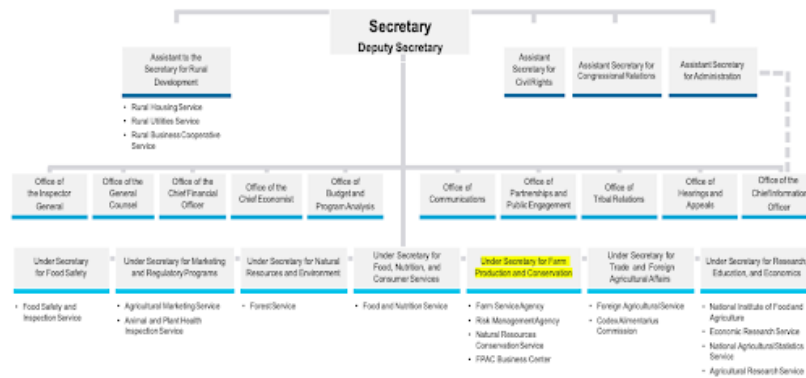


Figure 8: USDA Organizational Chart, Highlighting the Farm Production and Conservation Department Which Oversees the NRCS

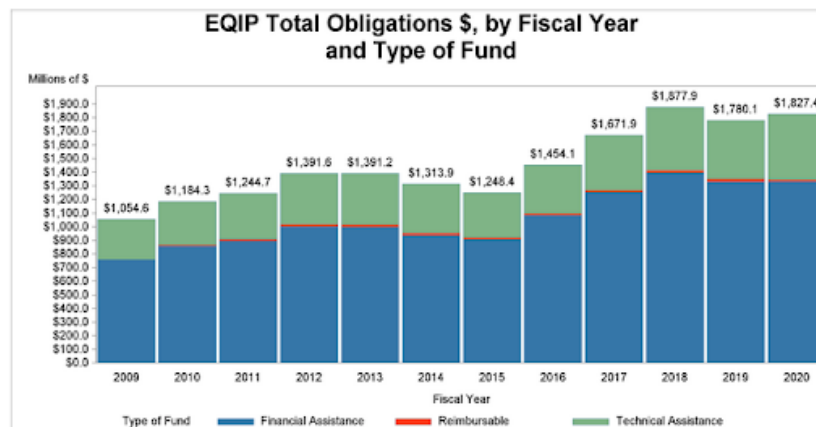


Figure 9: EQIP Historical Funding Trends

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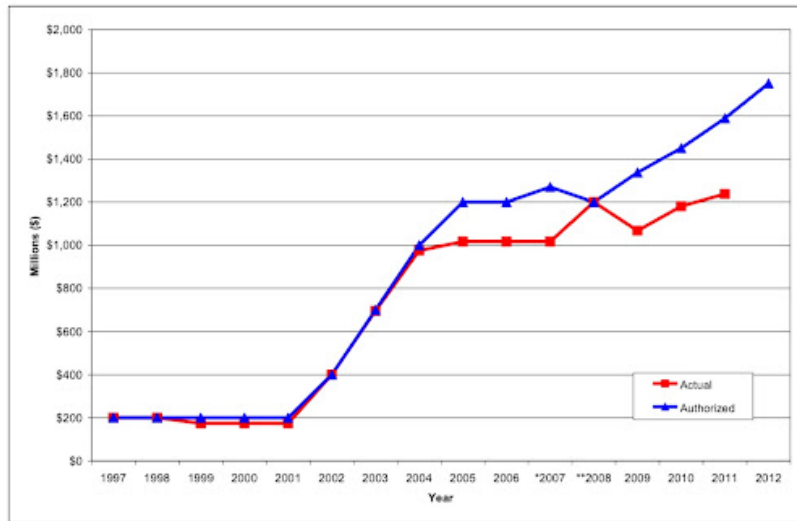


Figure 10: EQIP Funding and Reductions, FY 1997 - FY2012, \$ in Millions

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