The Nature Conservancy

Systems Thinking for
Jurisdictional
Sustainability

Acknowledgements

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Introduction

Sustaining tropical landscapes through jurisdictional programs is challenging in several ways:

- The problem is chronic and complex; moreover it often defies people's best intentions to solve it
- Diverse stakeholders find it difficult to align their efforts; people are working on a large number of disparate initiatives at once
- They try to optimize their part of the system without understanding their impact on the whole
- Stakeholders' short-term solutions can unwittingly make the problem worse over time
- Promoting particular solutions (e.g. best practices) comes at the expense of engaging in continuous learning

The purpose of this paper is to show how systems thinking can be used to meet these challenges to improve the design of jurisdictional programs for forest conservation and sustainable rural development. It introduces core systems, principles and basic tools; addresses the particular challenge of managing time delays; identifies four high leverage interventions for improving the performance of any system; examines how to apply systems thinking for jurisdictional sustainability; and analyzes system dynamics related to managing sector transitions, paying for conservation, and facilitating cooperation between donor and host countries.

What Is Systems Thinking?

Core Principles

Systems thinking is a set of principles and tools that enable people to achieve better results with fewer resources in more sustainable ways. The approach works because it:

- Increases people's awareness of how they might unwittingly be contributing to the very problems they want to solve.
- Empowers them to begin from where they can have the greatest impact on others, i.e. by reflecting on and shifting their own intentions, thinking, and actions.
- Mobilizes diverse stakeholders to take actions that increase the effectiveness of the whole system over time instead of meet their immediate self-interests.
- Helps people anticipate and avoid the negative, longer term consequences of well-intentioned solutions.
- Identifies high leverage interventions that focus limited resources for maximum, lasting, system-wide improvement.
- Motivates and supports continuous learning.

Award-winning systems thinker Donella Meadows defines a system as "an interconnected set of elements that is coherently organized in a way that achieves something."[1] In order to change a system, we need to first understand why it functions as it does, i.e. what it is achieving now. This can be challenging since systems operate in non-obvious, non-linear ways. Systems thinking is different from conventional thinking in several ways:[2]

Systems vs. Conventional Thinking

Conventional Thinking

- The connection between problems and their causes is obvious and easy to trace.

- Others, either within or outside our organization, are to blame for our problems and must be the ones to change.

- A policy designed to achieve short term success will also assure long term success

- In order to optimize the whole, we must optimize the parts.

- Aggressively tackle many independent initiatives simultaneously.

Systems Thinking

- The relationship between problems and their causes is indirect and not obvious.

- We unwittingly create our own problems and have significant control or influence in solving them through changing our own behavior.

- Most quick fixes have unintended consequences: they make no difference or make matters worse in the long run.

- In order to optimize the whole, we must improve relationships among the parts.

- Only a few key coordinated changes sustained over time will produce large systems change.

More specifically systems exhibit several characteristics, including:

- **Feedback:** Performance is largely determined by a web of interconnected circular (not linear) relationships of cause and effect. These circular or feedback relationships are of two kinds. *Reinforcing feedback* amplifies behavior over time leading to either continuous growth, which we often speak of as virtuous cycles or engines of success, or to continuous decay, which we often describe as vicious cycles. A simple example is when births increase population, and increased population generates more births. By contrast, balancing feedback seeks to correct behavior that is out of alignment with a desired state; it can manifest as either goal-seeking or problem-solving behavior, or as a system's fundamental drive toward equilibrium and its resistance to change. For example, population levels are stabilized by the carrying capacity of the environment in which the population lives and by deaths.

- **Time Delay:** Not all cause-effect reactions happen simultaneously. In fact many occur with significant time delay. For example, the gestation period in humans is 9 months, and it varies enormously within different animal and plant species (where it can be measured from the time of seeding to visible sprouting). Moreover, in social systems the short and long term consequences of the same action are frequently reversed: a short-term improvement in behavior can be undermined by negative long-term consequences, and alternatively we often need to incur costs in the short-term, i.e. invest resources, to achieve sustainable improvement in the long term. The existence of delays challenges us to apply patience and persistence in situations where we cannot shorten the delays, and to be sensitive to the potential negative unintended consequences of proposed solutions since effects are often reversed over time.

- **Mental Models:** In social systems, how people think – what they assume and believe to be true – is a key determinant of how the system behaves. For example, if we believe that a proposed solution will work, we might continue to support it even if evidence shows that it works in the short term but makes matters worse in the long term. Alternatively, we might choose to not support a fundamental solution because we tell ourselves that it is too expensive or too risky without actually testing the idea in more limited circumstances to demonstrate its effectiveness. A corollary to the power of mental models is that people are more likely to change when they first become aware of how they act now – not just in terms of how they *think* actions should affect desired outcomes but also how the same actions *actually* impact their own performance as well as the performance of others over time.

- **Leverage:** Systems improve as the result of a few key coordinated changes sustained over time. This means that resources are best focused on a limited number of strategic efforts that have the greatest and most sustainable impact over time. Conversely, it is not only unnecessary but also unwise for people to try to do as much as they can as quickly as they can to get the results they want.

The Iceberg

The principles of focus and leverage are built into a basic tool of systems thinking called the Iceberg. Like an iceberg, only small portions of systems are obvious "above the water line." At this easily visible level, we see observable events, e.g. crises we have to manage or fires we have to put out. If we look a little deeper we can see that most individual events emerge from patterns of behavior, or trends over time, which can help us to anticipate to some degree what will happen in the future. However, trends can be poor predictors of the future if the underlying systemic structures that give rise to the patterns are unclear; moreover, if the trends are undesirable, projecting conditions to get even worse is not helpful.

If we want to change current trends and improve system performance in sustainable ways, we need to clarify the underlying systems structure that creates the trends and in turn the events which emerge from them. Elements of systems structure include things like market relationships, policies, decision-making processes, and power dynamics. And even further below exist informal structures such as mental models or cultural assumptions, and goals – both explicit and implicit – that give rise to the formal structures.
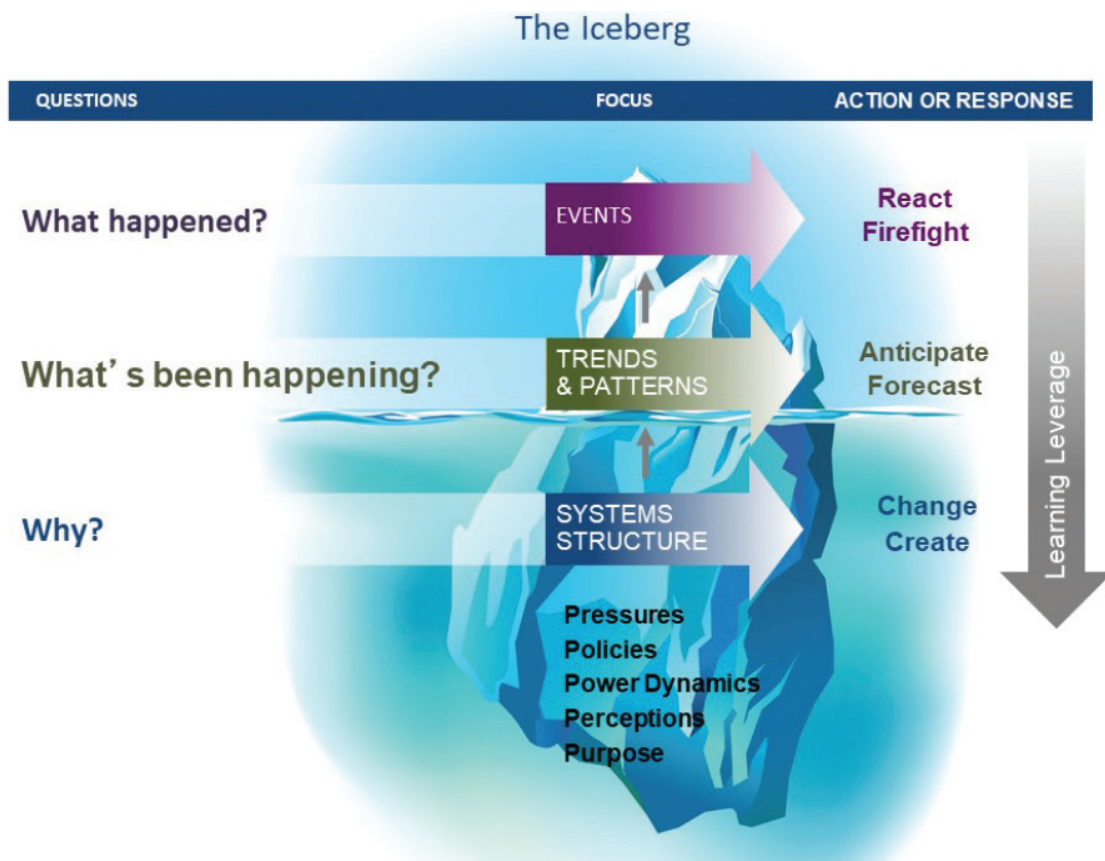
Reprinted from David Peter Stroh, Systems Thinking for Social Change: A Practical Guide for Solving Complex Problems, Avoiding Unintended Consequences, and Achieving Lasting Results (Chelsea Green, 2015) with permission by the publisher.

How To Read System Diagrams

System diagrams show cause-effect feedback relationships among critical variables in the system. They are designed to help answer a "Why?" such as "Why have been unable to achieve X goal or solve Y problem, often despite our best efforts?" In this sense they are not intended to map entire systems, which are inherently too complex to model, but to gain practical insight into what has led people to be relatively ineffective and what they can do differently to improve system-wide performance in sustainable ways. The basic components of system diagrams are:

- Key variables that affect and are affected by people's efforts to improve results

- Arrows or links which indicate that a change in variable A causes a change in variable B

- Parallel lines across a link that indicate significant time delay in a cause-effect relationship, i.e. it takes a long time for a change in A to cause a change in B

- Feedback loops labeled simply as R (reinforcing) or B (balancing), or more descriptively using such terms as "Engine of Success," "Vicious Cycle," "Quick Fix," or "Fundamental Solution" to describe how the loop behaves. Loops are often numbered to suggest the order in which to read and explain them.

- The letter 'S' at the end of a link indicates that a change in A causes a change in B in the same direction, while the letter 'O' at the end of a link indicates that a change in A causes a change in B in the opposite direction. Note that these are often summarized by explaining how full loops behave and do not appear explicitly in many diagrams.

- A box around a variable indicates where to start reading the diagram.

The following diagram summarizes this nomenclature:

Core Elements of a Systems Story
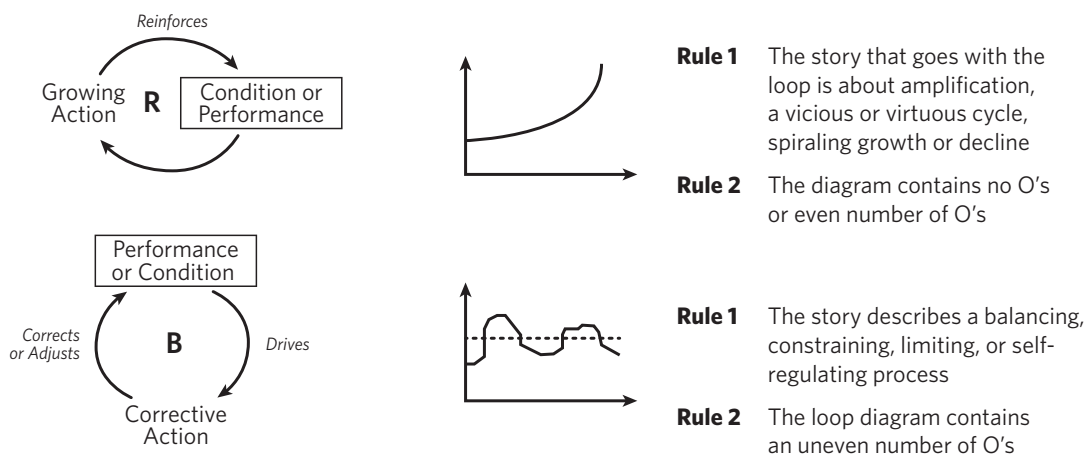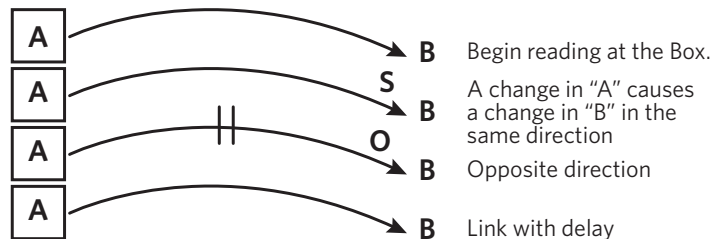
System Archetypes

Reinforcing and balancing feedback loops with time delays often combine in distinctive ways to create recognizable patterns of behavior. These are known as classic stories, system archetypes, or even system traps since they often mislead people into doing what appears to be rational at the moment but actually ends up being counterproductive. The core systems story describes how people tend to fall short of the results they want despite their best efforts, and system archetypes are variations on this theme. They describe different ways in which these shortfalls can result from people's underlying assumptions and actions, as well as from the multiple and sometimes conflicting goals that compete for their attention.

System archetypes can be extraordinarily helpful when starting to diagnose system behavior. Some of these archetypes, for example "tragedy of the commons," which describes a tendency of individuals to exploit common-pool resources, have become well known, while others are less so. Some examples of these archetypes are:[3]
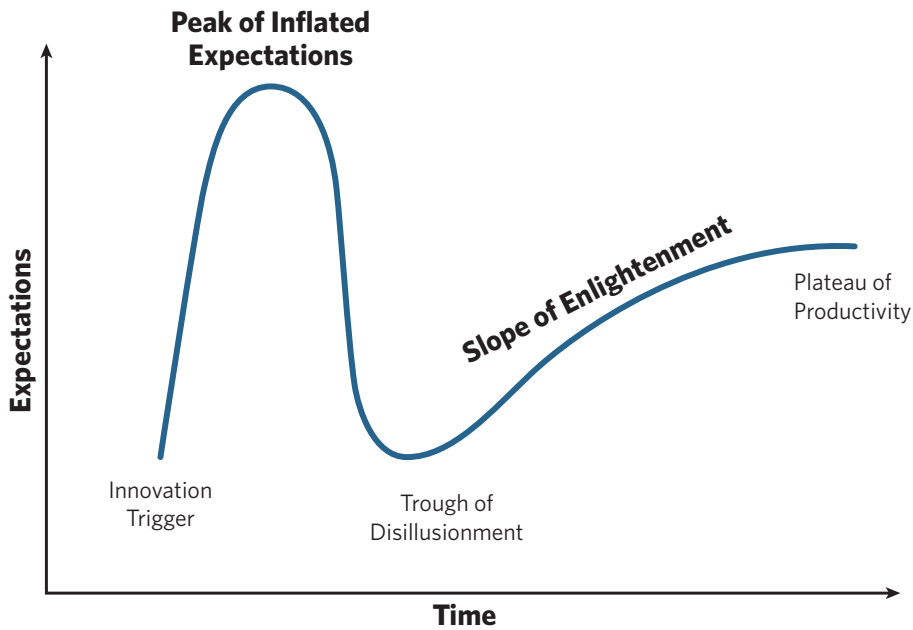
- **Fixes that backfire:** People implement a quick fix that works in the short run but creates unintended consequences that eventually exacerbate the problem. Sustainable intensification can be seen as a common example of this – in the beginning, it may reduce expansion of production into forested areas, but over the long-term it will likely actually contribute to increased deforestation as crop- and pasture-land becomes more profitable.

- **Shifting the burden:** People have a choice of implementing a quick fix or a longer term, more fundamental solution to a problem. Their natural tendency is to implement the quick fix because it is more expedient; however over time depending on the quick fix undermines their motivation and capacity to implement the more fundamental solution and makes the problem worse. An example of this is the policy of limiting deforestation by paying people not to deforest their land; while this solution works in the short run, it undermines people's motivations to implement a more fundamental solution of making local investments in sustainable economic development.

- **Accidental adversaries:** One party in an existing or potential partnership adopts a strategy that improves its own performance but inadvertently undermines the other party's success, which leads the second party to improve its own success but in a way that unwittingly undermines the performance of the first party. The result is that the benefits of the partnership to both parties devolve into an unintentional adversarial relationship. An example is the tension created between donors and host countries around REDD + funding when donors divert money from one country to another in hopes of achieving greater success, and host countries react by focusing on administration of donor funds or long-term solutions instead of demonstrating the shorter term progress that donors seek.

These and other examples will be described in greater depth using systems diagrams in the section on Analyzing Key Systems Dynamics in Managing Tropical Forests.

Managing Time Delay: A Matter Of Strategy And Patience

There is a tendency to interpret systems thinking as long-term thinking, thereby downplaying its importance as a tool for short-term decision-making. In reality systems thinking is about both the short and long term – not one or the other. Because of time delays and the tendency for short and long term consequences of the same policy to be reversed, systems thinking helps people make wiser short term decisions by evaluating the likely impact of these decisions within a long term context. This ensures that short term actions contribute to rather than undermine long term strategy.

As noted in the "Collective System Leadership" paper, sustainable development takes time. Unfortunately, before they have had time to mature, many potentially valuable landscape solutions have fallen victim to the "hype cycle." A hype cycle is a pattern many new technologies follow - some important need triggers the development of a new approach or the adaptation of an existing approach. Proponents emphasize the benefits of the approach and aggressively characterize its applicability, often understating the costs, necessary complements, and challenges (perhaps because they are not yet understood). This leads to high expectations and over-investment, often before the approach is fully understood. This leads to inevitable disappointment. Over time it is possible through impact assessment and adaptive management to find the core value of the approach. Garten's Hype Cycle, created to describe new technologies and shown in the diagram below, characterizes this cycle with apt and amusing terminology.

Peak of Inflated Expectations

Slope of Enlightenment

Plateau of Productivity

Innovation Trigger

Trough of Disillusionment

Expectations

Time

Adapted with permission from David Peter Stroh, Systems Thinking for Social Change: A Practical Guide for Solving Complex Problems, Avoiding Unintended Consequences, and Achieving Lasting Results (Chelsea Green, 2015).

A contrasting and more accurate view of the successful organic growth of a new initiative is that it follows an "S" curve.[4]

The "S" Curve of Organic Growth

3. Combat Complacency

2. Quantify and Communicate Outcomes

1. Ease Early Expectations – Build Capacity and Small Successes
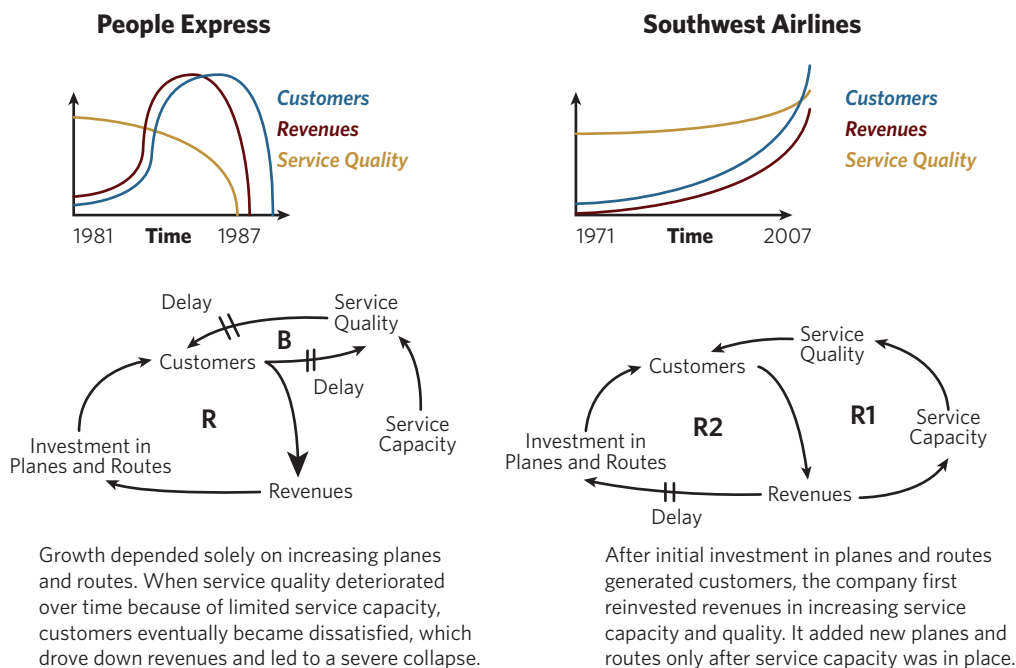
Progress

Time
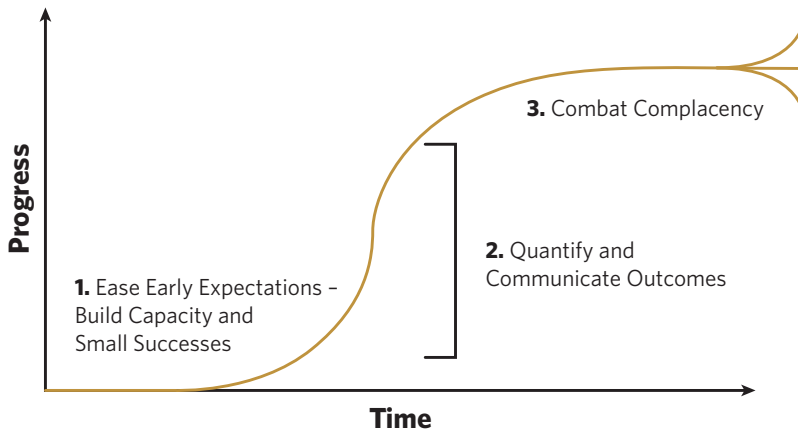
People's expectations for linear or even more aggressive growth are not in alignment with the "S" pattern of organic growth. There are three things you can do to align linear expectations with organic growth

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Initial successes are in the form of foundation-building: the development of new relationships, capacities, agreements, and learning systems. The establishment of this foundation paves the way for dramatic improvements in outcomes over time, culminating in a similar plateauing effect that Garten identifies. Effective development of a new foundation for collaboration is the best indicator of early success in any new undertaking. Such early successes are different from "quick fixes" in that they position the work for sustainable improvements instead of unintentionally undermine people's abilities to be effective in the long run.

A dramatic example of this difference can be seen in the growth curves of two "no frills" airlines: People Express and Southwest Airlines. People Express was the darling of Wall St. in the 1980's when it popularized the idea of competing with bus travel by offering cheap airfares on flights with limited services compared to those of its mainstream airline competitors. The company grew dramatically for 5-6 years and then just as suddenly went out of business. The graph on the left side of the diagram below "Distinguishing Two Engines of Growth" also shows that service quality declined from the airline's inception until its subsequent demise.

Distinguishing Two Engines of Growth

People Express

Southwest Airlines

Growth depended solely on increasing planes and routes. When service quality deteriorated over time because of limited service capacity, customers eventually became dissatisfied, which drove down revenues and led to a severe collapse.

After initial investment in planes and routes generated customers, the company first reinvested revenues in increasing service capacity and quality. It added new planes and routes only after service capacity was in place.

By contrast, Southwest Airlines actually created the first "no frills" airline ten years before People Express opened, but its performance curve has been very different. It is characterized by very slow but steady and accelerating growth in customers and revenues (similar to the first parts of the "S" curve) over the more than forty years of its existence. Another significant difference with People Express is that service quality has increased vs. decreased during its lifetime.

The difference in results stems from a significant difference in strategy between the two companies. People Express believed that success would come from establishing a large market presence early; hence it invested heavily in buying airplanes and routes without building the service capacity necessary to accommodate rapid increases in demand. By contrast, Southwest grew its market presence very slowly and always invested in developing sufficient service capacity in advance of opening up more flights and cities. Clearly the capacity building strategy has been more effective and sustainable.

Identifying Leverage Points

Systems pivot around leverage points, i.e. a few key coordinated changes made over time that create positive ripple effects and improve system performance in sustainable ways. Four important areas of leverage are:

- Increase awareness of how the system currently functions
- "Rewire" critical cause-effect relationships
- Shift mental models
- Redesign key system elements and engage in continuous learning

Increase System Awareness

Thinking systemically enables people to become more aware of the differences between the intended and unintended consequences of their actions, including how unintended consequences affect not only other stakeholders but also often undermine their own effectiveness. In other words, people become aware of how they are part of the problem – not just the solution, and this can empower them to consider more carefully and productively about their own intentions, assumptions, and behavior.

Whether or not they ever draw a systems diagram, they can learn to become more aware of how the system functions by asking five powerful questions:

1. Why have we been unable to solve this problem despite our best efforts?
2. How might we be partly responsible, albeit unwittingly, for the problem?
3. What might be unintended consequences of our previous – and proposed – solutions?
4. What are the payoffs to us of the current system?
5. What might we have to give up for the whole to succeed?

Rewire Cause-Effect Relationships

"Re-wiring" means altering the cause-effect relationships that influence how people behave. In order to shift system dynamics, some feedback relationships need to be created or reinforced to motivate new behavior or support what works. Others need to be weakened, broken, or even reversed to discourage reactive behavior and encourage more creative responses. In addition time delays need to be shortened, lengthened, or tolerated if they cannot be changed.

One of the benefits of mapping reality in terms of archetypes is that we know a lot about rewiring common archetypal patterns. For example, people embedded in Fixes that Backfire have three options:

1. Consider the negative long-term unintended consequences of alternative quick fixes, and choose a fix that appears to have none or at least fewer such consequences than the current one.
2. Continue to use the quick fix if you must, but consider ways to mitigate its negative consequences.
3. Uncover the root cause of the problem symptom that a fix is intended to address, and solve the underlying problem if possible.

The three rewiring options for Shifting the Burden are:

1. Reduce dependence on the quick fix.
2. Increase investment in the fundamental solution by creating a vision of an alternative future that compels this investment over the long term.
3. Where it is necessary to continue to use the quick fix while also working on the fundamental solution, design the fix in such a way that it builds towards this solution instead of undermines it.

There are three high leverage interventions that transform Accidental Adversaries into productive partnerships:

-   Clarify or remind both groups how they can benefit from partnering with each other
-   Point out that the ways in which they have undermined each other are unintentional; each group has simply been trying to succeed on its own without considering the impact of its solutions on the other
-   Support both groups to look for win-win solutions, i.e. those that increase each group's success while also supporting – or at least not undermining – the other group's performance

Shift Mental Models

People's mental models govern many of the critical cause-effect relationships that shape system performance. When considering an alternative to the existing quick fix in Fixes that Backfire, it is important to challenge the mental models that determine the use of this fix in the first place. In order to reduce dependence on the quick fix and build support for investing in the more fundamental solution in Shifting the Burden, it helps to determine the assumptions that favor use of the quick fix and those that discourage implementation of the fundamental solution. Potential partners seeking to reverse the Accidental Adversaries dynamic need to learn that the other party's disruptive actions are not intentional and that joint problem-solving can help both parties.

Surfacing, questioning, and testing people's beliefs and assumptions are essential skills in rewiring these relationships. The following five-step process can help:

1. Surface and respect current beliefs
2. Ask, "Do these mental models help us achieve what we want now?"
3. Stimulate alternative views
4. Develop a vision of what we want now and the mental models that would support it
5. Conduct and learn from experiments

Redesign Key System Elements And Engage In Continuous Learning

New insights must be reinforced by a reassessment and often redesign of system goals, metrics, incentives, authority structures, and funding streams. Note that these structural changes are most effective when built upon the first three leverage points:

-   A greater awareness of how the system operates now
-   Rewiring cause-effect relationships, and
-   Shifting mental models

They are best approached as supporting the above changes instead of as sufficient interventions unto themselves.

In order to be effective in the long term, people need to follow through on their implementation efforts with a process of continuous learning and outreach. While identifying leverage points often entails an initial reallocation of existing resources (such as where people place their intention, focus and time), this ongoing journey involves learning from experience, expanding the resource pool, and scaling up what works.

People ultimately only change their minds – and hence their long-term behavior – based on new experiences. Therefore, it is important that solutions be designed as a series of ongoing experiments to test new assumptions and ways of acting. Experiments help people navigate complexity and uncertainty, learn by doing, and build confidence in new ways of working.

Experiments often require engaging new stakeholders and generating new sources of funding. Systems analyses of why the system has under-performed in the past, coupled with systemic theories of change, can quickly orient new stakeholders about rationale and roadmap for the new direction. Ideally, improvements in results should pay for themselves over time and not remain dependent on external sources, but outside funding is usually required to jump start new ideas.

In its collaborative research with several nonprofits dedicated to expanding the impact of the social sector, the national association of funders Grantmakers for Effective Organizations (GEO) cites four broad strategies nonprofits can adopt to scale up their work:

1. Expanding the reach of a successful program in the same or different locations

2. Spreading an idea within a certain area or system – geographic, organizational, or professional

3. Increasing the number of people or places that use or apply a new technology, practice, or approach

4. Ensuring that ideas become embedded in policies and hence new behaviors pursued by a government body, corporation, or other institution[5]

GEO then translates these into four practices that grantmakers can follow to support all of these approaches:

1. Provide flexible funding over the long-term

2. Fund data and performance management capabilities

3. Support capacity building and leadership development

4. Support movements

GEO emphasizes the importance of scaling up with flexibility, i.e. ensuring that there is room to adapt what has been learned in one place to new contexts. I think of this as expanding the process of learning what works instead of seeking to impose specific solutions. Moreover, as in the four-stage process of applied Systems Thinking, an effective learning and outreach process needs to address both *internal* changes – those that shape people's personal intentions, thinking, and actions – as well as *external* changes in the beliefs, policies, and regulations that govern their collective behavior.[6]

In their research on reframing the art of helping, the award-winning journalist Nicholas Kristof and his wife Sheryl WuDunn see extensive opportunities for scale-up in adapting business competencies to what is traditionally defined as social or public sector work.[7] Integrating the strengths of business to increase society's abilities to help its vulnerable populations can come in multiple forms such as:

• Funding the development in nonprofits of such business infrastructure and skills as improved marketing, information systems, and personnel management (as also suggested by GEO)

• Social impact bonds that accrue private sector investments to fund public sector innovations

• Social enterprises that use a profit-making model to achieve a social as well as economic bottom-line

• Impact investing that funds new social enterprises from charitable donations

• Large company investments in developing and underdeveloped nations that build new markets to meet the needs of the poor as well as employee morale

How To Apply Systems Thinking
For Jurisdictional Sustainability

It helps to integrate systems thinking into the development of jurisdictional sustainability at five stages in the process:

1. **Build a firm foundation for change before expanding the scope of the work.** This foundation includes developing a strong leadership coalition supported by a backbone organization from the beginning, and continuing to strengthen both of these as results are achieved on the ground. Educating members of the leadership coalition about how systems behave and evolve can provide a shared language that helps them think and communicate more effectively about their work.

2. **Understand the root causes of underlying problems before trying to solve them.** As the Iceberg shows, root causes of problems are often not obvious – and there is enormous leverage in uncovering them before promoting particular solutions. These leverage points typically involve changes in policies, processes, power dynamics, perceptions, and purpose. The more people build a shared understanding of why a problem persists – including owning how they unwittingly contribute to the problem – the better positioned they will be to identify more fundamental and sustainable solutions.

3. **Look for opportunities that constitute small successes – not quick fixes.** Helping people recognize the tendency to confuse quick fixes with small successes enables them to identify short-term wins that build strategically toward sustainable long-term results. By contrast, to avoid quick fixes, ask them what might be the unintended longer term consequences of proposed solutions. In particular, look out for and avoid the classic systems traps of Fixes That Backfire and Shifting the Burden.

4. **Integrate leverage points into a systemic theory of change.**[8] Develop a circular theory of change, such as the one in the "Collective System Leadership" paper, about how to integrate leverage points sequentially to achieve sustainable results. The systemic theory of change not only provides a roadmap for how to move forward, but also a baseline against which to evaluate progress.

5. **Engage in continuous learning.** Because systems are ultimately too complex and dynamic to fully understand, adopt a spirit of ongoing experimentation and learning to clarify what works and what does not. Both successes and failures viewed in a long-term as well as immediate context provide lots of information for how to proceed.

Taken together these five steps can support people to achieve jurisdictional sustainability in both strategic and resilient ways.

Analyzing Key System Dynamics
In Managing Tropical Landscapes

System maps are designed to help people answer frustrating "Why" questions such as "Why have we been unable to solve X problem or achieve Y goal, often despite our best efforts?" While not intended to provide conclusive answers, they do stimulate more creative conversations where people move beyond feeling bad or blaming others to thinking more profoundly together about how they can work collaboratively to get the results they want.

The following examples are representative of the kinds of insights that systems maps can generate. They are not meant to be an exhaustive analysis of all the systemic issues related to the conservation of tropical forest landscapes through the development of jurisdictional sustainability, nor are the same dynamics found in all places. The three examples are:

1. Sector transitions – answering the question "Why is it so difficult to catalyze sustainability transitions across high impact sectors?"

2. Payments for conservation – answering the question "Why does paying people not to deforest their land undermine our ability to achieve local sustainable development?"

3. International cooperation – answering the question "Why do donor and host countries struggle to work together to implement REDD+?"

Sector Transitions

There is a recognition that a small number of economic sectors influence a large proportion of the landscape impacts in many places. Multiple strategies have evolved, but none is likely to have significant impact alone. People need to understand the dynamics in a particular place and develop an integrated suite of strategies that also mitigates negative unintended consequences.

The core archetype that can explain the challenge of implementing sector transitions are Fixes That Backfire. Here, several quick fixes reduce the problem symptom of Deforestation Driven by Agriculture in the short term. However, those same fixes are sometimes undermined by longer term consequences or actually backfire in ways that make the problem worse over time. Understanding why each fix backfires, and how the fixes interact with each other, can provide openings to more effective sector transitions.

Photo credit: Bridget Besaw, 2009

The following causal loop diagrams summarize the dynamics. In 'Sector Transitions-1' below the quick fix implemented to reduce Deforestation Driven by Agriculture is the introduction of Regulations & Penalties Restricting Expansion (Fix 1). While this fix works in the short term, it has two challenges: it requires increased capacity for enforcement, which takes time to develop thereby undermining the effectiveness of the regulations (Undermine 2), and it has the potential to cause impoverishment and revolt from local people (Backfire 3), both of which in turn weaken efforts to decrease Deforestation.
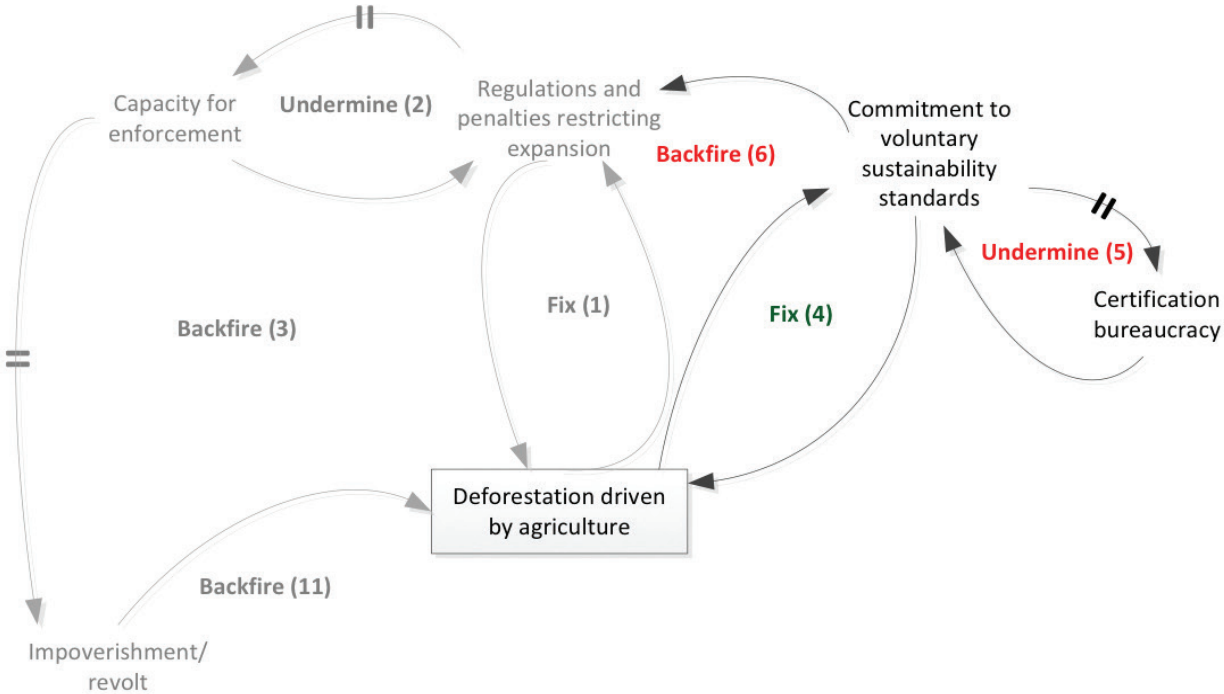
Sector transitions - 1
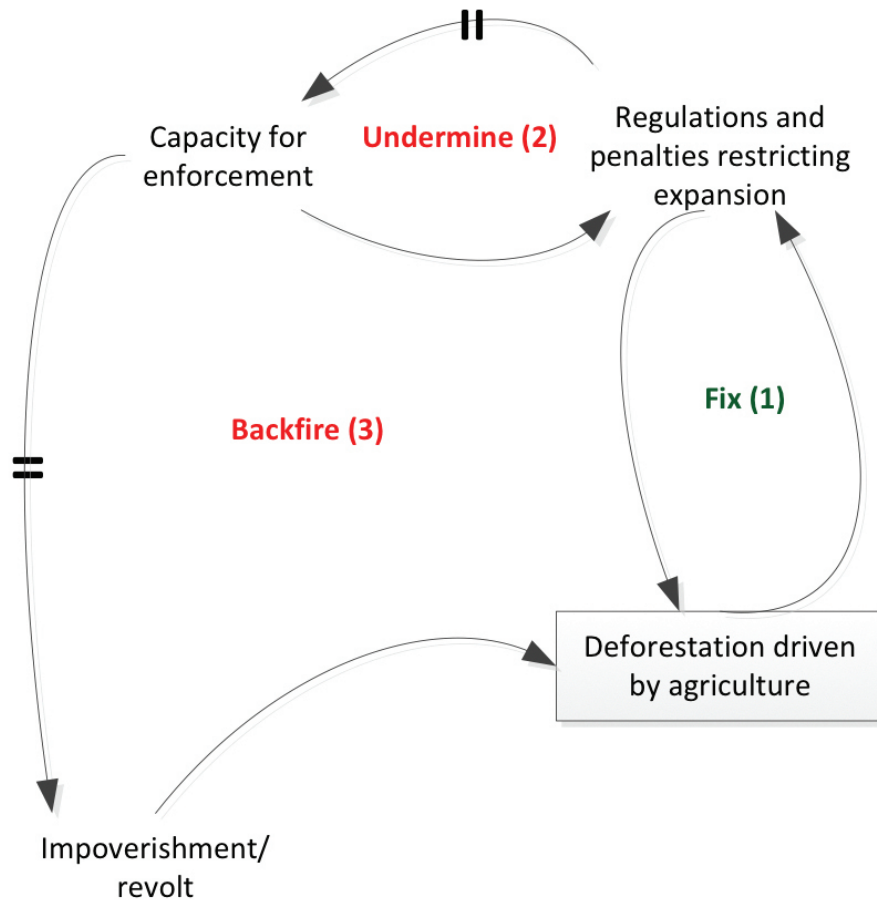
- Fix 1: stronger regulations and penalties restricting land use change
- Undermine 2: lack of capacity undermines effectiveness of regulations and penalties
- Backfire 3: increased enforcement of strict regulations can also lead to impoverishment and revolt

The second fix described in 'Sector Transitions-2' below is to encourage companies to increase their Commitment to Voluntary Sustainability Standards (Fix 4). While this can reduce Deforestation, the additional bureaucratic requirements and the ineffectiveness of enforcement can undermine the impact of voluntary sustainability standards (Undermine 5). Voluntary standards can also produce the longer term negative consequence of reducing pressure for legal and regulatory reforms needed to shift the whole sector and thereby lead to further Deforestation over time (Backfire 6).
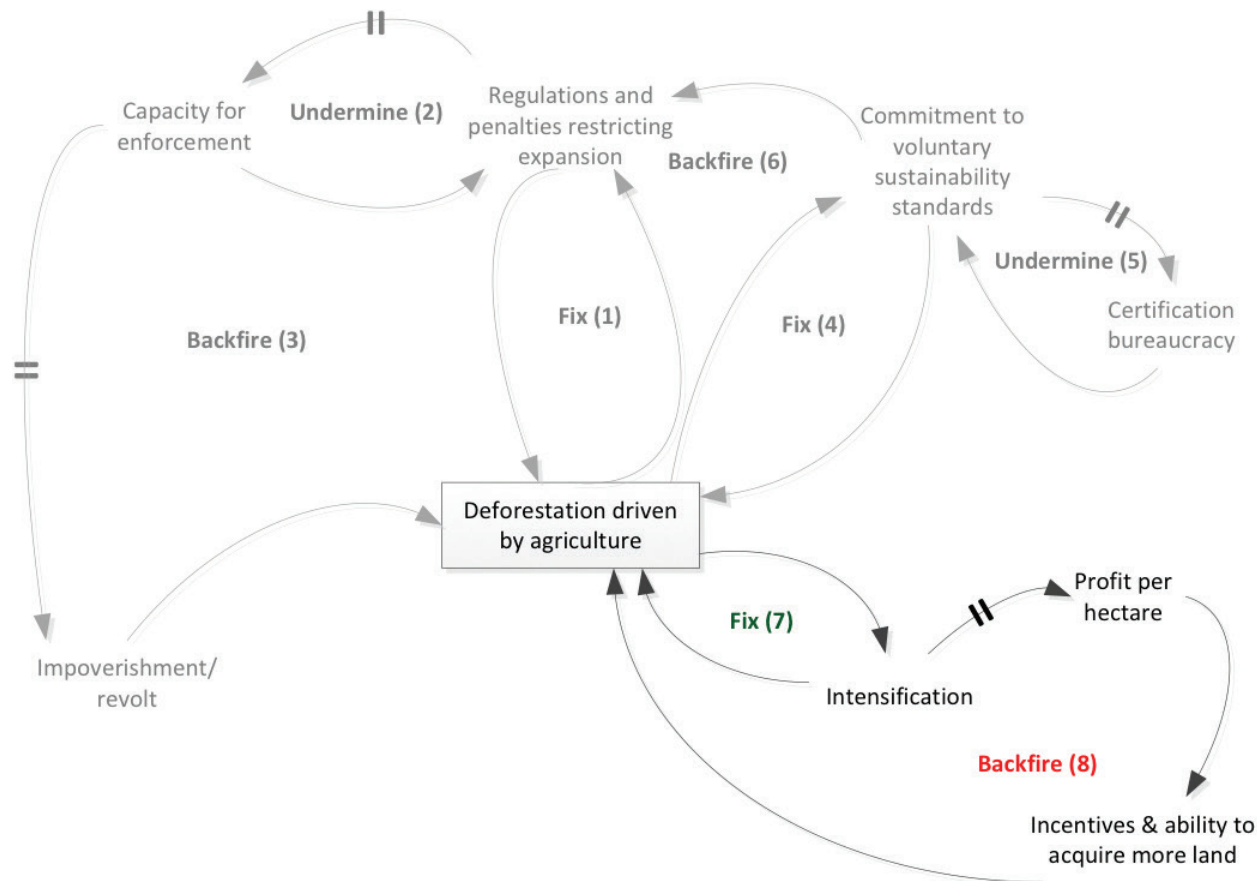
Sector transitions - 2

- Fix 1: stronger regulations and penalties restricting land use change
- Undermine 2: lack of capacity undermines effectiveness of regulations and penalties
- Backfire 3: increased enforcement of strict regulations can also lead to impoverishment and revolt
- Fix 4: voluntary sustainability standards (certification; NDPE)
- Undermine 5: additional and ineffective bureaucracy undermines voluntary standards
- Backfire 6: voluntary commitments can reduce pressure for legal reform

The third fix is to increase agricultural Intensification so that companies can make more money from the same amount of land thus discouraging further Deforestation (Fix 7). However, the unintended negative consequence of increasing Profits per Hectare has been to increase companies' Incentives & Ability to Acquire More Land, which, other things being equal, increases rather than decreases Deforestation (Backfire 8).
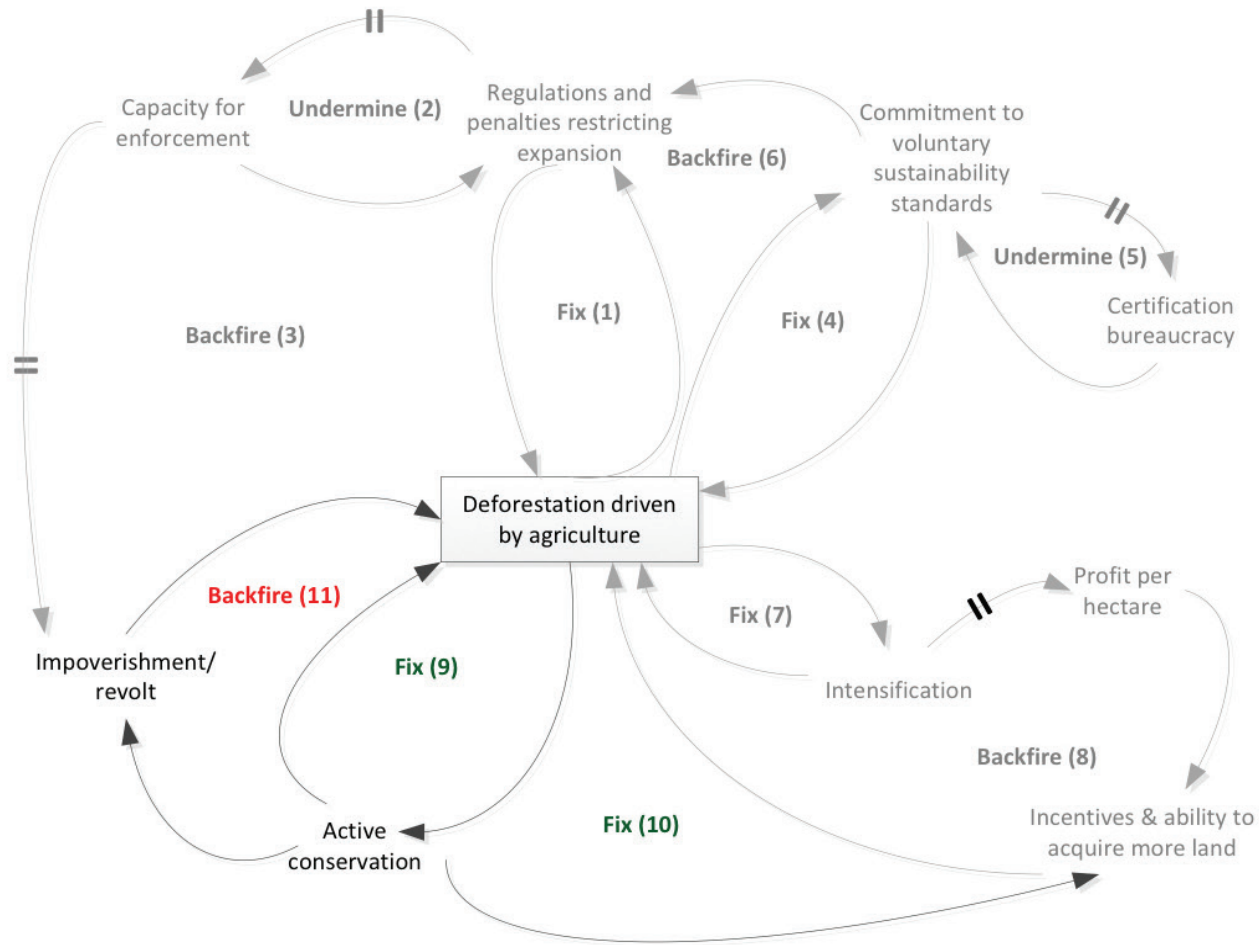
Sector transitions - 3

- Fix 1: stronger regulations and penalties restricting land use change
- Undermine 2: lack of capacity undermines effectiveness of regulations and penalties
- Backfire 3: increased enforcement of strict regulations can also lead to impoverishment and revolt
- Fix 4: voluntary sustainability standards (certification; NDPE)
- Undermine 5: additional and ineffective bureaucracy undermines voluntary standards
- Backfire 6: voluntary commitments can reduce pressure for legal reform
- Fix 7: intensification to "take pressure off forests"
- Backfire 8: intensification increases profitability and incentive to deforest

The fourth fix has been to increase Active Conservation as shown in 'Sector-4' below. This reduces Deforestation directly (Fix 9) and indirectly since the protection of land for conservation purposes also reduces companies' Ability to Acquire More Land (Fix 10). However, if conserved land produces no obvious economic benefits, it also increases Impoverishment and can lead to Revolt among people otherwise forced to make a living elsewhere, thereby putting increased pressure on Deforestation as a way to help people survive economically (Backfire 11).
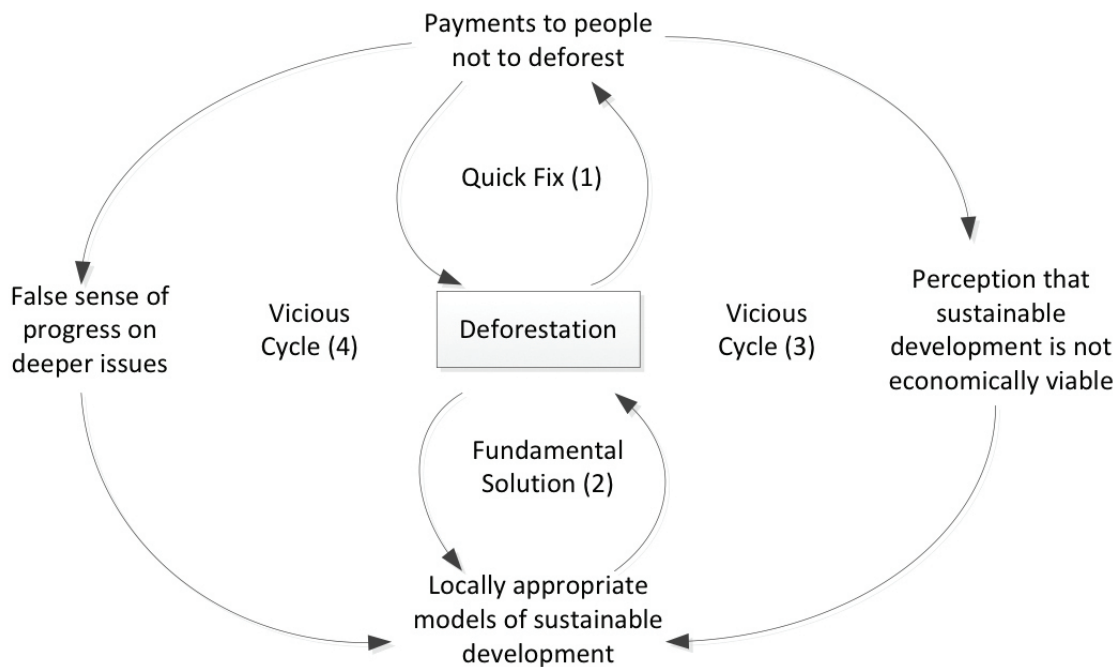
Sector transitions - 4

- Fix 1: stronger regulations and penalties restricting land use change
- Undermine 2: lack of capacity undermines effectiveness of regulations and penalties
- Backfire 3: increased enforcement of strict regulations can also lead to impoverishment and revolt
- Fix 4: voluntary sustainability standards (certification; NDPE)
- Undermine 5: additional and ineffective bureaucracy undermines voluntary standards
- Backfire 6: voluntary commitments can reduce pressure for legal reform
- Fix 7: intensification to "take pressure off forests"
- Backfire 8: intensification increases profitability and incentive to deforest
- Fix 9: active conservation reduces deforestation
- Fix 10: active conservation reduces the risk that intensification drives faster deforestation
- Backfire 11: conservation without good development options can drive impoverishment and revolt

Implementing each fix independently leads to negative long term consequences that are difficult to mitigate separately. At the same time they represent a range of possible responses to deforestation driven by agriculture that might be more effectively implemented in concert, thereby increasing both the ecological as well as economic value of protecting tropical forest landscapes.

Payment For Conservation

Another solution to deforestation has been to pay people temporarily to not deforest the land. Examples are payments for ecosystem services schemes, subsidy programs, and many approaches to REDD+. However, Payment for Conservation is not sustainable since the payments typically end after a certain period of time (see Quick Fix 1 in the diagram 'Payment for Conservation' below). Moreover, this solution actually undermines the more fundamental – albeit longer term – solution of building locally viable models of sustainable development (Fundamental Solution 2). The reason is twofold. Payment for Conservation increases the Perception That Sustainable Development is Not Economically Viable (Vicious Cycle 3). Because people receive a subsidy for conserving their forest, they begin to believe that the forest cannot have significant intrinsic value. It also creates a False Sense of Progress (Vicious Cycle 4). People cite the amount of money disbursed or hectares covered in the program as progress, while often not monitoring whether the forest actually remains standing over the long term. This dynamic is typical of the Shifting the Burden archetype where depending on a quick fix undermines the system's motivation and ability to implement a more fundamental solution, thereby further increasing the problem (in this case Deforestation) over time.

Payments for conservation: a challenge of shifting the burden

Payments to people not to deforest

Quick Fix (1)

False sense of progress on deeper issues

Vicious Cycle (4)

Deforestation

Vicious Cycle (3)

Perception that sustainable development is not economically viable

Fundamental Solution (2)

Locally appropriate models of sustainable development

The leverage in this situation is to shift from payments intended solely for conservation to funding that spurs local investments in sustainable economic development. Such investments need to be guided by a vision of solutions that are ultimately both environmentally and economically beneficial because only these will work in the long run.

International Cooperation

The last dynamic to look at here is the conflict which can emerge between donor and tropical forest countries as they seek to implement REDD+. Both parties should benefit from collaborating with each other: donor countries funding tropical forest countries to implement REDD+ should be able to benefit from progress made by tropical forest countries in demonstrating the effective use of these funds (see Prospects for Partnership (1) in the diagram 'International Cooperation' below). However, when donor countries fail to see desired results on the time-scale expected, they tend to divert funds to support approaches working mainly through NGOs or the private sector or shift funds to programs in other countries. While this works for donors in the short run (see Donor Quick Fix (2) below), it reduces direct funding and coordination in the host country, thereby disrupting a host country's progress in implementing REDD+. In seeking to make more progress, the tropical forest country focuses on developing a locally viable sustainable development agenda including less costly, more expedient solutions or on longer term initiatives (Tropical Forest Country Quick Fix 3 below), thereby reducing indicators of short-term success that further disrupt the donors' sense of progress. The combination of both parties' quick fixes along with the negative consequences they produce create an Adversarial Relationship (4 below), which undermines their Prospects for Partnership.

International cooperation: the problem of accidental adversaries
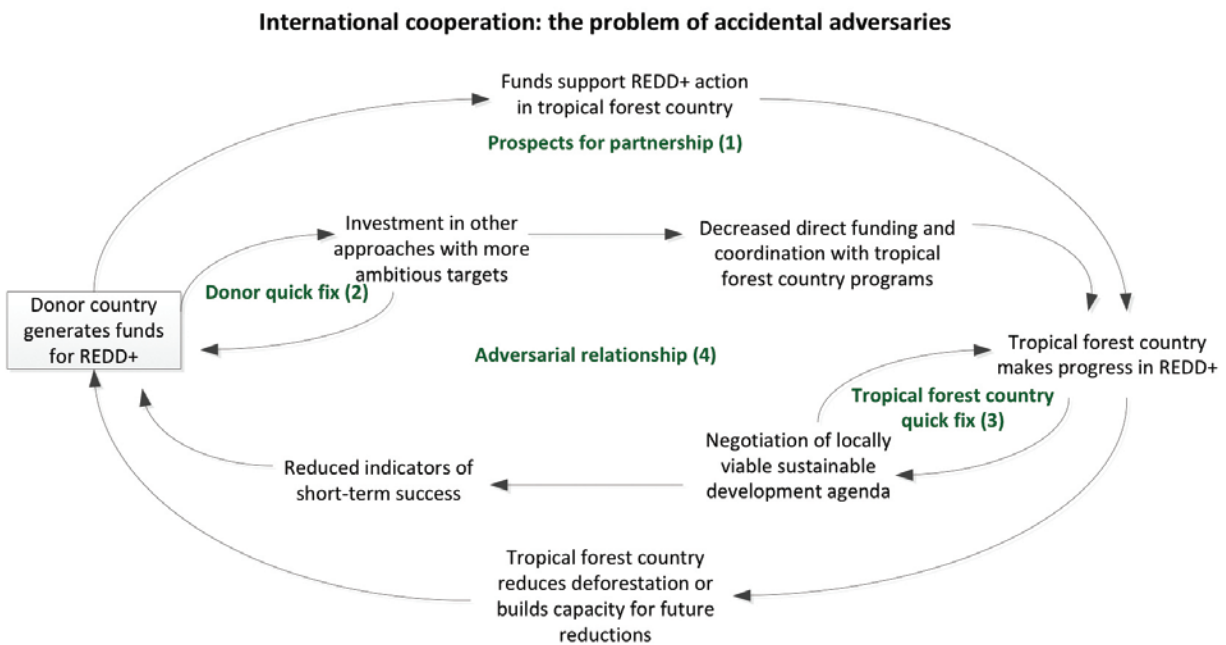
In order to rebuild a trusting and productive partnership, it is important that both parties:

- Be reminded of how they can both benefit from partnering with each other (see the Prospects for Partnership)

- Understand that the ways in which they have undermined each other are unintentional; each group has simply been trying to succeed on its own without considering the impact of its solutions on the other

- Develop win-win solutions, i.e. those that increase each group's success while also supporting – or at least not undermining – the other group's performance

Conclusion

Tropical forest landscapes themselves, and the jurisdictional-scale programs aimed at catalyzing sustainability transitions on the scale of millions of hectares in these landscapes, are enormously complex. Systems thinking is a discipline developed over many decades to help actors navigate complexity and influence complex systems. Hopefully these few examples reveal the potential for systems thinking to help understand why current approaches do not work as well as we hope and reveal opportunities to improve approaches in the future.

Photo credit: Erich Schlegel, 2016

Endnotes

1   Meadows, Donella. *Thinking in Systems* (Chelsea Green, 2008). Page 11.

2   Stroh, David. *Systems Thinking for Social Change: A Practical Guide to Solving Complex Problems, Avoiding Unintended Consequences, and Achieving Lasting Results* (Chelsea Green, 2015). Page 15.

3   Stroh, David. *Systems Thinking for Social Change: A Practical Guide to Solving Complex Problems, Avoiding Unintended Consequences, and Achieving Lasting Results* (Chelsea Green, 2015). Pages 52-66.

4   Stroh, David. *Systems Thinking for Social Change: A Practical Guide to Solving Complex Problems, Avoiding Unintended Consequences, and Achieving Lasting Results* (Chelsea Green, 2015) Pages 200-202.

5   Grantmakers for Effective Organizations. 2013 *Pathways to Grow Impact: Philanthropy's Role in the Journey* (GEO Resource Library, January 29, 2013).

6   Reflecting on Peace Practice Program. *Lessons from Program Effectiveness*.

7   Nicholas Kristoff and Sheryl WuDunn. *A Path Appears*. (Knopf, 2014).

8   Stroh, David. *Systems Thinking for Social Change: A Practical Guide to Solving Complex Problems, Avoiding Unintended Consequences, and Achieving Lasting Results* (Chelsea Green, 2015). Pages 167-194.

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