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Research, part of a Special Feature on Archetype Analysis in Sustainability Research

Sustainability through institutional failure and decline? Archetypes of productive pathways

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ABSTRACT. Although current literature on sustainability governance and institutions is preoccupied with innovation, novelty, success, and "best practice," there is an emergent tendency to consider decline and failure as opportunities and leverage points to work toward and to achieve sustainability. However, although failure, crisis, and decay have been treated extensively, the link toward their productive potential has remained underdeveloped in the literature. Using a systems perspective, we described five archetypical pathways through which crisis, failure, deliberate destabilization, and active management of decline may facilitate sustainability transformation through adaptation, learning, providing windows of opportunity, and informed choices regarding stability versus change. We sought to provide a basis for further conceptual and empirical inquiry by formulating archetypical pathways that link aspects of failure to productive functions in the sense of sustainability. We started out by describing five archetypical pathways and their conceptual underpinnings from a number of different literatures, including evolutionary economics, ecology, and institutional change. The pathways related to (1) crises triggering institutional adaptations toward sustainability, (2) systematic learning from failure and breakdown, (3) the purposeful destabilization of unsustainable institutions, (4) making a virtue of inevitable decline, and (5) active and reflective decision making in the face of decline instead of leaving it to chance. These archetypical pathways were illustrated by a number of sustainability-related empirical case studies. In developing these archetypes, we have sought to move forward the debate on sustainability transformation and harness the potential of hitherto overlooked institutional dynamics.

Key Words: *collapse; creative destruction; dismantling; experimentation; policy transfer; policy window; renewal; systems thinking*

INTRODUCTION

The recent sustainability discourse is dominated by a focus on innovation or the "new" (Shove 2012). These include technological or socio-technical innovations (Smith et al. 2010), business innovations (Schaltegger and Wagner 2011), social innovations (Jaeger-Erben et al. 2015), policy and governance innovations (Meadowcroft and Fiorino 2017), and democratic innovations (Mattijssen et al. 2015). There is hardly any reason to question the importance of this trend: There is a need for new ideas, technologies, governance structures, alternative economic structures, and business models. However, this domination of novelty may prevent us from recognizing alternative, or complementary, perspectives to achieve sustainability. For one thing, we should be reminded that innovation as such is often unsustainable (Røpke 2012) or may only sustain unsustainability (Blühdorn 2013). Quite recently, there has therefore been a growing unease with the noted bias on innovation, even from within innovation studies (Sveiby et al. 2012). Second, and more importantly, a focus on innovation and the creation of novelty may obscure the productive role of processes of failure and decline in achieving sustainability.

Our interest lies in institutions as the "stable, valued, recurring patterns of behavior whose most important function is to facilitate human collective action" (Fukuyama 2014:462). The institutional change literature, although traditionally focused on explaining the emergence of new institutions, has seen a recent boom in research on policy failure (McConnell 2015, Bovens and 't Hart 2016), governance failure (Howlett and Ramesh 2014, Peters 2015), institutional failure (Acheson 2006), and policy dismantling (Bauer and Knill 2014). These contributions add to our understanding of processes and causes of failure, as well as their circumstances, and partly also of consequences of failure (Derwort et al. 2018). However, few if any of these contributions address the potentially desirable function attached to failure and decline. Instead of propagating yet more innovations, we will turn to the productive side of destruction and failure.

The sparse treatment of productive elements of failure and decline in the recent literature is somewhat astonishing. Philosophers and writers of most different fields of study have long recognized, for example, the value of "creative destruction" for the functioning of market economies (Schumpeter 1950), of collapse for healthy renewal of ecosystems (Gunderson and Holling 2002), and of learning from the failure of past societies (Diamond 2005). All of these are strikingly absent in recent grand debates on institutional change, decline, and failure. Although, certainly, an integrated theory of productive elements of failure and decline in institutional change would be an alluring project, our aim is more modest. We formulate five archetypical pathways that encapsulate the ways in which institutional failure and decline is potentially related to productive, more sustainable outcomes.

To this end, we try to enrich the institutional change literature with considerations from various fields in which productive functions have been described, such as ecology, evolutionary economics, or anthropology. The common thread in these archetypical pathways is that they all refer to institutions' dysfunctionality. They either take dysfunctionality as an opportunity for productive change toward sustainability, or to deliberately make normatively undesirable institutions dysfunctional, or as an opportunity to reflect and decide on the desirability of a declining, i.e., increasingly dysfunctional, institution. To compare different pathways on a relatively abstract level, we use a systems lens, acknowledging that institutional systems are complex adaptive systems subject to "lock-in," path-dependent dynamics, and self-stabilization and are capable of adaptation, learning, and transformation from a more or less stable systems

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state to another (Bardach 2006). Considering how such productive pathways work in practice, we move toward a policy design perspective on institutional change, aiming to stimulate and facilitate further conceptual and empirical work on harnessing productive pathways of institutional failure and decline.

INSTITUTIONAL CHANGE ANALYSIS: A SYSTEMS APPROACH

Our logic is not to explain institutional change. We seek to identify opportunities related to dysfunction, i.e., institutional failure and decline, for productive change. By "productive," we mean changes toward more sustainable solutions that benefit the common good rather than particular interests, that help to protect the natural resources and life-support systems, and that embody lasting solutions rather than those undermining societal foundations. Ultimately, we consider the scope for agency within institutional regimes (see Fischer and Newig 2016).

Human societies organize themselves through institutions, i.e., the structures that make societal interaction predictable and guide human action toward collective goals (Scharpf 1997). We are principally concerned with formal institutions such as written rules (laws and regulations) and agreements (plans and contracts) that are collectively binding. Because institutions guide and constrain action, institutional change represents a crucial realm of leverage for sustainability transformations (Abson et al. 2017). In particular, we assume that although some institutions may suffer from dysfunctionality, others continue to strive (Fukuyama 2014). Our main focus lies on institutions as "regimes," acknowledging the close interaction of rules with the actors who, through their practices, reproduce and stabilize or erode and counteract them (Streeck and Thelen 2005).

Many recent contributions on institutional or policy change, explicitly or implicitly, employ a systems lens (Kingdon 1999, Streeck and Thelen 2005, Bardach 2006). We follow this path, drawing on the following systems concepts and approaches.

We assume institutions, understood as institutional regimes, to be complex adaptive systems (Pahl-Wostl 2009). That is, they are capable of learning and adapting to changing circumstances, while maintaining their identity. However, considering shorter time spans, institutions tend to be self-reinforcing and self-reproducing and thus oriented toward stability. Although stability is necessary for institutions to function in society, it may result in outright institutional inertia (North 1990). Stability versus change is thus one recurrent theme in our analysis (Leroy and Arts 2006). In addition, we consider whether institutions remain functional or become dysfunctional, and whether change occurs toward sustainability or whether it cements or even drives unsustainability. Finally, change in institutions can be quicker or slower, and we acknowledge that very different dynamics can be at play, such as "punctuated equilibria," in which long periods of stability are interrupted by periods of rapid change (Jones and Baumgartner 2012), as well as slow and gradual change of institutions, in which existing institutions interact with and may over time be replaced by new ones (Streeck and Thelen 2005, Mahoney and Thelen 2010).

Two systems concepts are of particular relevance because they are instrumental in delimiting and distinguishing processes of institutional change, including failure and decline. These are path dependency and the duality of structure and function.

First, path dependency has been described as a general feature of complex systems dynamics where small changes in initial conditions and positive feedbacks lead to self-reinforcement and "lock-in" of systems features (Arthur 1989). Acknowledging that institutions are never created nor changing in a void, path dependency has been a key concept in historical institutionalism (Thelen 1999) and has mostly flourished with regard to technology and economic developments. Path dependency, in our approach, constitutes an important element in institutional dynamics, because we perceive institutions as potentially interlinked, embedded, and locked in with technology, infrastructure, and the natural environment. For it is precisely the challenge to "unlock" locked-in institutional regimes in so far as they are judged unsustainable.

Second, while building on historical institutionalism as one major intellectual foundation, we also draw on structural functionalism, in the tradition of Merton, Parsons, and Luhmann, as "a framework for building theory that sees society as a complex system whose parts work together" (Macionis and Gerber 2010:14). Institutions, then, constitute social structures that serve particular functions in society.[1] Departing from a strong functionalist position, this is not to say, however, that institutions perform perfectly or even that all institutions still serve societal functions. Some may have become obsolete, with structures remaining, but dysfunctional or afunctional under changed circumstances, whereas others undergo fundamental structural change to keep up or improve functioning. Generally, structure and function are independent in that functions, such as the sustainable management of a commons, may be maintained by very different institutional structures, e.g., privatization or state-enforced limits to resource use.

These considerations help us define what we understand by institutional failure and decline. Assuming that institutional structure and function can both either remain stable or decline yields four different constellations of institutional change, or stability, as depicted in Table 1.

Table 1. Typology of institutional change with respect to preservation or collapse of structure and function (source: Newig 2013).

	Preservation of Structure	Decline or Radical Change of Structure
Preservation of function	(a) Stable institution	(b) Institutional transition/ adaptation
Dysfunction or radical change of function	(c) Path-dependent reorientation	(d) Institutional collapse

When both structure and function prevail, an institution stays stable (a). When both decline or change substantively, we find institutional collapse (d), in which the result of change is either an absence of the original institution or a change so dramatic that we need to speak of a new institution, similar to what Streeck and Thelen (2005) have termed "exhaustion" or "displacement," respectively. Quadrant (b) constitutes the prototype of

"successful" institutional change in that its basic function is preserved, or even enhanced, while, or because, its structure alters substantially or is replaced. This aligns with resilience thinking, according to which complex systems, put under pressure, are able to adapt their structure to maintain functioning (Folke et al. 2010). Quadrant (c), finally, constitutes a constellation similar to what Thelen and colleagues (Streeck and Thelen 2005:31) have termed "conversion," i.e., "redeployment of old institutions to new purposes." Acknowledging the crucial role of path dependency, of the "stickiness" of once established institutions, we call this constellation "path-dependent reorientation." Institutional structures prevail but have either become dysfunctional or have begun to serve new functions. The latter may occur either because circumstances have changed, rendering an existing institution dysfunctional, or because ambiguities in an institution's function allow for reinterpretation following shifts in power constellations (Streeck and Thelen 2005).

Summing up, institutional decline can relate to both function and structure. To define institutional failure, a normative element comes in, with institutional failure as a dysfunctionality of a normatively desirable institution. Next, we will identify and discuss archetypical pathways, through which these four types of institutional change may work productively toward sustainability.

THE PRODUCTIVE POTENTIAL OF INSTITUTIONAL FAILURE AND DECLINE: FIVE ARCHETYPICAL PATHWAYS

We took at multistep approach to identify five distinct, archetypical pathways of how to harness the productive potential of institutional dysfunction, depending on whether the system is still functioning and whether it appears desirable to preserve the system in its current state. Building on earlier work on "productive functions" of failure and decline (Newig 2013), we engaged in an iterative process of enriching, refining, and grounding them in scholarly debates (as summarized by Derwort et al. 2018) to arrive at the five archetypes we present. Although we do not suggest these to be definitive, the resulting archetypes may serve as diagnostic tools (Oberlack, Sietz, Bürgi Bonanomi, et al., *unpublished manuscript*) and support future empirical studies in diagnosing their systems of concern, anticipating potential problems, and assessing potential sustainability strategies. We delineated the archetypes as pathways that have distinct configurations of triggers of change and agents of change, as detailed in Table 2. The pathways are archetypes because a single case can be characterized by one or multiple archetypical pathways, as detailed in the *Discussion*. This notion of archetypes allows more fine-grained generalization than typologies of cases (Oberlack, Sietz, Bürgi Bonanomi, et al., *unpublished manuscript*). Subsequently, we describe each of the archetypical pathways, drawing on the relevant academic debates and origins behind them, discussing the constellations in which these occur and potential outcomes for sustainability, speculating on the role of institutional capacity and of agency required to harness each pathway, and highlighting current research questions. For illustrative purposes, we draw on one key empirical example for each archetype. A structured comparison of these empirical cases can be found in Table 3.

Institutional adaptation in the wake of crisis

Assuming that institutional systems are able to respond to pressure through reorganization, learning, and adaptation without compromising, and rather even enhancing, key systems functions, crises have the potential to trigger institutional adaptations toward sustainability. Given prevailing institutional inertia and lock-in, such change is less likely under "normal" conditions (Stern 1997). Crises are defined as "periods of disorder in the seemingly 'normal' development of a system" (Boin et al 2005:2). Institutional crisis can be attributable to internal failure, for example, caused by excessive rigidness, as conceptualized in the literature on social-ecological systems (Gunderson and Holling 2002, also cf. Scott 1998), or caused by external events, such as natural disasters or technical accidents. In both cases, crises lay bare weaknesses and dysfunctionalities of an institution. For if an institution is properly working in the face of a severe disaster, there appears hardly any need for change. In this way, a crisis acts as a focusing event (Birkland 1997).

Crisis bears the potential to invoke a process of institutional adaptation and improvement in two distinct ways. The first is learning, or lesson drawing. A crisis presents an opportunity to learn if institutional malfunctions or dysfunctions were not known before. Hence, a crisis presents an ultimate test bed to the functioning of an institution, in a sense, an unwanted experiment with negative outcome.[2] In the simplest case, learning from crisis entails a mere "fix" of an institution, such as the level of a tax (first-order learning, or change, sensu Hall [1993]), but more often, it will also involve an element of innovation.

Institutional failure and subsequent change following environmental disasters such as the Sandoz incident, spilling chemicals into the Rhine river at Basel in 1986 (Wieriks and Schulte-Wülwer-Leidig 1997), may serve as a case in point. What was described as "western Europe's worst environmental disaster in decades" (Schwabach 1989:443) evidenced broad institutional dysfunctions on the part of the Rhine treaty regime, notably the International Commission for the Protection of the Rhine (ICPR), including incompatibility of national alarm systems and failure of Swiss authorities to comply with existing safety standards of the Rhine Chemical Convention, which, however, did not provide for incentives for compliance nor sanctions for noncompliance (Schwabach 1989). Following the disaster and its unmasking of the deficiencies of the existing institutional system, institutions were adapted and improved. Next to more technical fixes such as the installation of a disaster warning and prediction system, the crisis also sparked innovation. The Rhine Action Programme was launched by the ICPR member states, which led to a significant decrease of pollutants over the following 5 years (Wieriks and Schulte-Wülwer-Leidig 1997).

The case also evidences the second element of institutional adaptation and improvement: the creation of a window of opportunity for institutional change (Kingdon 1999). Different from the learning element, the point is that the focusing event directs public and political attention to the dysfunctional institution. The focusing event facilitates the adoption of institutional improvements that already exist as an idea but have not made it into the decision-making process. Hence, existing knowledge and existing solutions are not taken up by decision makers, or decision makers deliberately chose not to act on them. It is only as a result of crisis that they do act (Birkland 2009).[3] In a similar manner, windows of opportunities following crisis play an important role in the social-ecological systems literature, building on panarchy theory (Chapin et al. 2010, Gelcich et al.

Table 2. Archetypes of productive functions in comparison

	1. Adaptation in the Wake of Crisis	2. Systematic Learning from Failure	3. Purposeful Destabilization	4. Making a Virtue of Inevitable Decline	5. Active and Reflective Management of Decline
Focusing event or trigger	Sudden focusing event	No specific trigger needed	No specific trigger needed	Rather incremental shift	Critical institutional decline
Initial constellation	Crisis reveals dysfunctioning of institution	Openness to learn from failed experiences with parallels to current system	Stable, locked-in, but normatively undesirable system	Gradual decline that cannot be halted but redirected and turned into something new, useful, productive	Existing institutions decline; this gradual decline can either be halted or accelerated
Functionality of current system	Functioning, but weaknesses revealed by crisis	Good, but improvements possible	Stable and functioning but unsustainable	Fundamentally challenged or declining	Declining or about to decline
Action by institutional regime actors	Adapt, reorganize: respond to failure	Learn from failure	Destabilize, dismantle	Innovate, create	Reflect and decide: active decision making to speed up or halt decline
Harnessing failure or decline as …	An opportunity to improve and strengthen resilience of current system	Sources of knowledge and ultimately as opportunity to improve current system	Opportunity to abolish an unsustainable system and pave the way for a more sustainable alternative	Opportunity to move in different direction	Opportunity to reflect and make an informed decision on whether to accelerate or halt a declining institution
Outcome	Renewal and strengthening of existing system	Improvement of current system	Major reform	Innovations, path-dependent reorientation	Avoid loss of vital structure or avoid inefficient structure
Institutional capacity needed	Flexibility to adapt in the face of crisis; capacity for "intelligent" failure	Institutionalization of evidence-based approaches to policy making; reflective analysis of own situation	Political force to bring about major change; developed viable alternatives	Political structures fostering creativity	Structures for monitoring of decline; active and informed decision making; deliberative capacity; clarity on goals
Role of science	Thorough analysis of crisis pathways	Systematic aggregation of relevant evidence	Provision of scenarios of consequences of destabilization	Provision of innovative ideas to reuse obsolete institutional structures	Analysis of strengths and weaknesses of declining institution

2010), as well as in the literature on socio-technical transitions to sustainability (Frantzeskaki 2011).

The Sandoz accident indeed triggered massive attention within both the public and the political spheres of the riparian countries. This allowed breaking the gridlock in an existing, slow, multiparty process of chemical regulation, which had already produced considerable policy solutions, leading to the creation of the successful Rhine Action Programme (Wieriks and Schulte-Wülwer-Leidig 1997).

The question is, of course, how likely is it that institutions are in fact adapting in the wake of crisis? Institutional regimes may or may not learn from crisis (Boin et al. 2008). Lacking adaption bears the risk of an even greater crisis in the future, threatening the viability of the system at large. Disaster studies have shown moderate learning efforts in the wake of crisis; notably, opportunities for change toward sustainability have often gone unseized (Pelling and Dill 2010, Brundiers 2016). Stern (1997) reviews factors that may inhibit learning after crisis, including on the one hand an overgeneralization of crisis lessons and on the other hand too narrow a focus on the crisis event or hasty reforms, both of which involve overlooking important aspects in the functioning of the institution as a whole. Analyzing the aftermath of the 9/11 attacks, Birkland (2009:148-149) theorizes that decision makers are likely to engage in "superstitious learning – that is, learning without some sort of attempt to analyze the underlying problem," satisfying public demands with merely symbolic action and hence making instrumental learning relatively unlikely.

Given the purported benefits of crisis for institutional adaptation, one may ask whether crisis should in fact be deliberately introduced. One perspective calls for an institutional design that allows for crises to happen or even to deliberately introduce small elements of crisis. In fact, intentionally including crisis episodes and experimentation in institutional design may serve as a mechanism for "intelligent failure" (Sitkin 1996) and the opportunity to learn and develop innovative ideas, especially in complex systems faced with uncertainty. Presenting a broader view on crisis and renewal, panarchy theory, drawing on Schumpeter's idea of "creative destruction," assumes that perpetual crises allow for a system's healthy renewal (Carpenter et al. 2002). Homer-Dixon (2006:289) identifies "the fundamental challenge humankind faces: we need to allow for breakdown in the natural function of our societies in a way that doesn't produce catastrophic collapse but instead leads to healthy renewal."[4] Others assume small crises are not sufficient to induce change, but rather that very large crises are needed for pronounced institutional change (Drazen and Easterly 2001). However, it is important to point to the looming risks of introducing big crises, given the impossibility of predicting and controlling the outcome, particularly in complex systems.

What can we therefore conclude for institutional design? A key element lies in ensuring that institutions are designed to be open

Table 3. Illustrative cases of archetypes of productive functions

	Archetype 1: Sandoz Incident, Switzerland, and Rhine Basin	Archetype 2: Species at Risk Act, Canada	Archetype 3: Coal Phaseout, United Kingdom	Archetype 4: Reorientation of Military Conscription, Germany	Archetype 5: Active Abolishment of Military Conscription, Germany
Focusing event or trigger	Chemical spill into the Rhine River	None	None	Increasing contestation of compulsory military service	Legitimacy of compulsory service as a whole strongly contested
Initial constellation	Spill reveals incompatibility of national alarm systems, failure to comply with existing safety standards	Openness to learn from failed experiences (United States) with parallels to current system (Canada)	Technological system of electricity production stable and locked-in but incompatible with UK climate goals	Gradual decline of interest in military conscription	Loose application of draft examination rules leading to increasing injustice in drafting procedures and increasingly strong public opposition
Functionality of current system	Functioning but heavy institutional weaknesses revealed	System functioning well, improvements possible	Stable and functioning but environmentally unsustainable	Idea of military conscription challenged by society, functionality about to erode	Mandatory service (social and military) in serious decline
Action by institutional regime actors	Technical fixes, e.g., installation of disaster warning system, coupled with innovation (Rhine Action Programme)	Using failure from U.S. experiences to inform policy making in Canada	Introduction of new regulations and carbon pricing to phase out coal-fired electricity generation	Relaxation of draft rules coupled with the creation of new civil service functions to benefit German society	Fundamental reform, replacing mandatory conscription for men with a voluntary military service open to both men and women
Harnessing failure or decline as …	Opportunity to implement institutional improvements, which were partly already available	Source of knowledge, opportunity for learning	Opportunity to decarbonize electricity production	Opportunity to maintain support for conscription and strengthen civil service	Opportunity to abolish conscription following thorough public debate
Institutional change type (see Table 1)	Strengthening of existing institutional system	Improvement of existing system for ecosystem management	Major reform/ transformation of electricity system	Partial reorientation of existing draft structure	Accelerate collapse of an institutional structure

to the potentially transformational learning and adaptation opportunities invoked by crises (Eburn and Dovers 2015). Institutional systems need the capacity and flexibility to learn from, adapt to, and reorganize after crisis. This may also involve clear accountability and responsibility structures that secure democratic accountability of responsible agents while avoiding the blame game, and that establish a culture that, especially under conditions of complexity and uncertainty, regards failure as immanent to the system and actively encourages learning. Having said that, the extent to which failure can be allowed for in an institutional system depends crucially on what is at stake. If human security is at stake, the bar will be set considerably higher than when this is not the case.

Systematic learning from failure

Institutional improvement through learning and adaptation resulting from crisis experience happens in a rather ad hoc manner. It requires events to happen until deficiencies of institutions become apparent and until political momentum for change is built up. However, institutional improvements can also occur through more systematic learning from one's own experience or that of others (see, e.g., Howlett 2012) without the immediate trigger of crisis as a focusing event. In this form of learning, experiences come from various sources, such as evidence and lessons drawn from one's own and other jurisdictions, from predecessors within one's own jurisdiction, or from other policy fields, typically entailing some form of policy transfer and adaptation to the "domestic" context (Stone 2012). As Diamond (2005:24) has put it: "For the first time in history, we face the risk of a global decline. But we also are the first to enjoy the opportunity of learning quickly from developments in societies anywhere else in the world today, and from what has unfolded in societies at any time in the past."

Learning from one's own experience ("endogenous learning"; Newig et al. 2016) has the advantage of being considered more adequate for one's own situation and, hence, superior to the experiences of others. However, learning from others ("exogenous learning"; Newig et al. 2016) may be equally powerful as learning from one's own experiences is often underestimated vis-à-vis internal adaptation. First and foremost, there are many more external experiences than internal ones. This is what Diamond, in his previous quote, refers to. At least in theory, the body of knowledge from cases of institutional design and implementation is vast. Hundreds, if not thousands, of assessments of how institutions work in the field of sustainability must be available in the published record; add to this ongoing or recent experiences in which involved decision makers or stakeholders are still available for direct exchange. Further, learning from one's own experiences, in particular if learning from failure is involved, often includes being confronted with political and emotional issues, and decision makers have to confess to mistakes they have committed. Learning from others allows for a more detached, less emotional analysis.

Learning from others, or policy transfer, has traditionally focused on learning from "successful" examples, implying it is "natural

for decision makers … to learn from abroad in order to find inexpensive and quick solutions to policy problems" (Coletti 2015:328). From a psychological point of view, it is understandable that decision makers prefer to focus on promising solutions rather than on failed experiences (Overman and Boyd 1994), especially if they are under pressure to find a solution to an urgent matter. Moreover, in academic research, studies with weak or null results are much less likely to be published or written up in the first place, leading to a publication bias toward strong positive effects (Franco et al. 2014).[5] In reality, however, while failure is common, success is rare. Several authors have voiced unease with the common preoccupation with learning from success in the sense of "best practice" examples, as advocated by Bardach (2004). For quite often, "best practice" means little more than "best guess." In the context of administrative reform, Overman and Boyd (1994) criticize that best practice research has neglected thorough learning from experience in that it focuses on short-term lessons; that best practice research is not cumulating evidence and experience and is hardly transferable because of mainly advocating context-insensitive blueprints; and that best practice research is rather biased by current, largely untested paradigms and fashions. The policy transfer literature has highlighted that learning from others by no means guarantees success, pointing to the dangers of uninformed, incomplete, or inappropriate policy transfer, all of which likely lead to failure (Dolowitz and Marsh 2000).

These considerations lead us to the study of failed experiences as a promising approach. The Canadian Species at Risk Act of 2002 (S.C. 2002, c. 29) constitutes an exemplary case in point. Its enactment drew on almost 30 years of observing the heavy regulatory controls on endangered species in the United States (see Illical and Harrison 2007). Despite the many similarities that Canada and the United States share regarding ecosystems and the endangered species therein, policy responses to this issue differ: The U.S. Endangered Species Act of 1973 relies strongly on regulation and coercion, imposing the costs of endangered species protection primarily on the private sector. By contrast, Canadian policy emphasizes subsidized voluntary stewardship, with the option of stricter regulation only to be enacted if needed and then requiring compensation to private interests, making the state bear the costs for protection of endangered species. Some of the dissimilarities between the two approaches may be attributable to certain institutional differences. However, clearly, "negative lesson drawing" (Stone 2017) from the U.S. experience played an explicit role in drafting the Canadian policy. These negative lessons stipulated by the United States' coercive approach mainly included the following: negative economic consequences for landowners and the business community; creating perverse incentives to "shoot, shovel, and shut up" to avoid restrictions on land use; and the approach leading to many instances of litigation and even to the diversion of funds from species protection programs to cover judicial conflict resolution. In the Canadian policy-making process, landowners and business interests mobilized a strong opposition force, directly referring to the U.S. experience and requiring a balance between environmental and business concerns.

Using failure as a source of knowledge for improving current institutional systems suggests two conclusions for institutional design: First, knowledge about the failed experiences of others has to be made available or somehow introduced into one's own institutional system. This requires the kind of science that produces unbiased and reliable accounts of failed institutions and attempts, a desideratum that addresses as much the sphere of policy, which may occur through funding programs, as the sphere of academia, which needs to be more engaged with failure and the related learning potential than it has in the past. One way to foster the availability of this knowledge to policy makers may be through strengthening cross-jurisdictional exchange, either through direct communication among public administrators or via intermediary brokers. Literature on governance networks points to similar conclusions (Newig et al. 2010). Second, as the case of the Canadian Species at Risk Act illustrates, decision makers must be willing and capable of learning from systematic assessments of failed institutions, and this presupposes a better integration of scientific advice (Howlett 2012). In this vein, Volden (2016) found learning from failed institutions to be more likely in states with professional rather than less professional legislatures.

Purposeful destabilization of unsustainable institutions

The first two archetypes describe how existing institutions can be improved by adapting to or learning from failure. This presupposes that these institutions are generally functioning and also normatively desirable in the sense of sustainability. At times, however, more fundamental institutional change toward sustainability is required, beyond the mere improvement of existing systems (e.g., Westley et al. 2011). Depending on the nature of the required change, this may relate to both the structure, e.g., coal-based electricity provision, and the function, e.g., electricity provision as such, of an institution. Although a focus on innovation, which is dominating the current discourse, is and will remain important, there is the risk of neglecting the potentially important and productive role of destabilizing unsustainable institutions.

To implement more sustainable institutions, existing ones need to be replaced for institutional inertia to be overcome (Geva-May 2004). Put differently, the destabilization of existing institutions can help pave the way for alternatives (Turnheim and Geels 2013). In addition, the mere abolition of an unsustainable institution may be an end in itself. Although institutions may destabilize "spontaneously," i.e., without deliberate political intervention, through a variety of means and processes (see Streeck and Thelen 2005), we are concerned with how to unlock and purposefully destabilize through deliberate political steering. We thus depart from the Schumpeterian notion of "creative destruction," which indicates the inevitable and necessary destruction as a side effect of the creation of the new in a market economy. The academic literature has introduced a variety of terms, such as elimination, termination (Geva-May 2004), or dismantling (Bauer and Knill 2014), but active termination and dismantling appear to be relatively rare in practice (Geva-May 2004).

Subsequently, we discuss two important aspects related to the active destabilization of institutions, which we may term (1) the "problem of unlocking" and (2) the "problem of restabilization." Each bears different implications for governance.

With regard to the first problem, institutions, having coevolved with their broader societal environment in a path-dependent way, are stabilized, i.e., locked in, through multiple interactions with

the societal environment in which they are embedded. In the context of sustainability, such interactions concern industrial practices, technology and infrastructure, cultural codes, consumer practices, administrative routines (cf. Turnheim and Geels 2013), and the biophysical environment (Chapin et al. 2010). This raises the crucial issue of how to "unlock" or "deinstitutionalize" institutional regimes. For such processes, the term "exnovation" has recently become popular in the context of sustainability transitions (David 2017). Strategies to unlock may include (cf. Seto et al. 2016) attacking an institution's vulnerable parts, e.g., unpopular subsidies for incumbent industry; exerting aligned pressure onto an existing regime (Geels and Schot 2007); coherent policy mixes (Oliver 1992, Kivimaa and Kern 2016, David 2017); actively "unlearning" administrative practices (Fiol and O'Connor 2017); or changing discourses (McGuire and Hardy 2009).

Regarding the destabilization of existing institutional regimes, the notion of a "window of opportunity" or "policy window" (Kingdon 1999) is relevant in the sense that either a policy window is required for institutional destabilization to take place (Geva-May 2004) or institutional destabilization creates a window to enable further policy change, e.g., allowing niche innovations to replace a dominant regime (Geels and Schot 2007). A case in point for this latter constellation from a sustainability perspective can be found in the UK government's proposals to end unabated coal generation in Great Britain by 2025. Although not affecting the function of the electricity market, i.e., the provision of electricity, the reform seeks to fundamentally transform the structure of electricity production by decarbonizing it. The closure of power plants is to be achieved through a combination of activities, including requirements under the Industrial Emissions Directive (Directive 2010/75/EU), setting a 1500-hour/year limit on operations for the majority of coal units, and carbon pricing, affecting the profitability of coal generation (Department for Business, Energy and Industrial Strategy 2018). By informing the energy industry of its decision 10 years before the actual closure, the British government aims to minimize the impact on the electricity system by providing investors with certainty to enable low-carbon alternatives at a time when old coal-fired power plants are due to either undergo upgrades and retrofits or be taken off-line.

Concerning the second problem, the establishment of an institutional alternative is contingent on whether the opportunity is actively harnessed for institutional change, or whether destabilization merely leads to an institutional void that can be filled by random forces. What we term the "restabilization problem" has been aptly expressed by Fukuyama (2014:462): "Political decay is therefore in many ways a condition of political development: the old has to break down in order to make way for the new. But the transitions can be extremely chaotic and violent; there is no guarantee that political institutions will continuously, peacefully and adequately adapt to new conditions." The Arab Spring revolutions are a sobering, albeit extreme, case in point, sadly proving the difficulty of restabilization and of putting in place alternative regimes following the destabilization of existing ones (Geddes et al. 2014). In the less extreme example of the UK coal phaseout, the UK government has repeatedly emphasized that the technological replacement will be chosen based on market conditions. However, despite the strongly improved performance of renewable energy technologies such as solar and wind power, the government strongly promotes the expansion of nuclear technologies, most noticeably in the construction of the controversial Hinkley Point C nuclear power station. Taken together, institutional destabilization bears considerable danger and must be approached with great care and understanding of the institutions under consideration. These cases demonstrate that a precondition for effective restabilization is the existence of viable alternatives that can be activated once a window of opportunity opens through regime destabilization.

Institutional destabilization for sustainability need not be followed by an alternative replacement. For example, the recent European Union (EU) decision to ban three neonicotinoid pesticides from all field crops serves as a case in point. In the face of growing evidence that the use of those pesticides poses a threat to pollinators, such as honey bees, the EU commission passed the ban in April 2018 (Carrington 2018). In this light, the decision can be seen as a case of dismantling of harmful institutions and practices to contribute to the sustainability of European ecosystems.

Making a virtue of inevitable decline

The previous archetypes addressed either the strengthening of existing institutions through crisis or failure or the deliberate removal of existing institutions for the better. Our fourth archetype, by contrast, is concerned with situations in which decline is inevitable, because of external or internal factors. Decision makers are then faced with having to either give in to this decline or collapse or use the opportunities generated through this decline. These opportunities can arise either through a new and innovative redeployment of existing structures or through a full institutional redesign in the face of inevitable decline.

Institutions decline for a variety of reasons. One is that they simply wear out over time. What Streeck and Thelen (2005:29) term "exhaustion" refers to a dynamic that makes institutions increasingly vulnerable and self-undermining over time. Institutions may simply age and become obsolete as circumstances change, or they become too complex in their process of adaptation, turning impractical or illegitimate over time (Streeck and Thelen 2005), thus equaling a dynamic of loss of resilience and subsequent breakdown as described in panarchy theory's "conservation" and subsequent "release" phases (Gunderson and Holling 2002). Second, institutions may slowly decline but formally remain intact, called "drift" by Streeck and Thelen (2005). This typically happens as institutions are no longer updated to changing circumstances, as in the nonadaptation of pollution standards to increasing traffic.[6] Third, as new institutions are introduced, existing ones may invariably erode, simply because only a limited number of rules may be adhered to by addressees. What Streeck and Thelen (2005) have termed "displacement" typically happens slowly and subtly, such as by new institutions competing with and gradually replacing old ones. More rarely, displacement may occur in the course of "catastrophes" such as lost wars or revolutions. Whole institutional systems may be overthrown and replaced by new ones, e.g., by invaders, in the course of such major events.[7]

Given inevitable institutional decline, productive potentials arise, first, by reusing institutional structures, whose function has become obsolete, for novel purposes. This is a case of path-

dependent reorientation, as introduced in the section *Institutional change analysis: a systems approach*. Existing but functionally devoid institutional structures, i.e., institutional "ruins," which often bear ambiguity, are reinterpreted in an innovative way. Existing institutional "material" is worked with to produce something new and more sustainable.[8] A case in point is the German civilian service, which emerged out of and partly replaced the military conscription system (the latter is discussed in more detail in *Active and reflective management of decline—instead of leaving it to chance*). For decades in the Cold War period, West German law mandated military service for adult men. Only under strict circumstances could draftees object to military service for reasons of conscience and perform a civilian service instead. With the Cold War ending, the draft system was increasingly contested in public and political debates, leading to a stepwise relaxation of the criteria for objecting to military service, up to a point where the majority of draftees "chose" the civilian service. This allowed supporting, for example, elderly care but also created innovative tasks in environmental services, such as work in national parks or in sustainability education. Hence, the institutional structure of the draft system remained intact, but its original function to support and maintain a sufficiently large army in Cold War times gradually eroded, paving the way in part for a substantial redeployment for civil and ecological purposes. The importance of these "new" functions can be judged by the fierce debates on the abolishment of the conscription (see *Active and reflective management of decline—instead of leaving it to chance*), in which some argued in favor of keeping the conscription system to maintain the civilian functions.

Second, decline or collapse can be used as an opportunity for a fundamental institutional redesign, instead of more incremental adjustments, as described in archetypes 1 and 2. A case in point is the U.S. town Greensburg, Kansas, which after being hit by a tornado, was completely rebuilt as a green and sustainable city (Brundiers 2016). The physical or built environment was destroyed, which triggered not only a physical but also an institutional rebuild. The notion of a "blank slate" has been introduced to describe such situations (Agrawal 2011). This may occur even with essentially well-functioning systems, which are destroyed by accident, as in the mentioned case, but provide opportunities for change and reorientation, e.g., toward sustainability. So this does not mainly strengthen the immediate functioning of the system, but it provides opportunities for reorientation toward more lasting, sustainable institutional setups. In a similar vein, the notion of a "reset button" has been introduced to characterize disasters, as "what happens in their wake is shaped by historical forces, to be sure, but they also enable greater leveraging power to new resources, fresh endeavors and innovative institutions, because older structures and processes lose at least part of their historical force" (Agrawal 2011:291). Different from a blank slate, however, the reset button is more appropriate to constellations of a somewhat dysfunctional institutional system, grown old and having become too rigid over time, an argument also made in panarchy theory (Carpenter et al. 2002). This refers mostly to the internal functioning of a system.

Active and reflective management of decline—instead of leaving it to chance

In what we describe as our final archetypical pathway, we turn to the constellation in which an existing institution has started to decline, but where, different from archetype 4, decline can still be halted, and what opportunities and challenges this poses for governance. We argue that the main productive function in such constellations is harnessing the opportunity to reflect and decide on the desirability of a declining, i.e., increasingly dysfunctional, institution. We term this active and reflective decision making, as opposed to letting things happen. Slightly different from the previous archetypes, there is as strong an emphasis on the preservation of institutions as there is on their decline and destabilization. The unregulated decline of existing institutions, as opposed to active and reflective management, is not unproblematic but may give rise to two fundamental, but mutually exclusive challenges. We discuss these, along with potential productive governance responses, by drawing on the case of German conscription, in which the institution of mandatory military service, and connected to it the alternative civil service, was ultimately abolished in the face of a number of growing pressures.

First, if existing but declining institutions are generally still functional and normatively desirable, there is the danger of potentially irreversible loss of institutional elements such as knowledge, networks, or actor capacity (Newig 2013). An active and reflective management of decline could prevent such losses. In cases of beginning institutional exhaustion, decision makers could engage in active reform to halt decline and to prevent an eventual institutional breakdown. In cases of displacement through new institutions, decision makers could engage in preserving or transferring useful elements of the old institution. In cases of drift, decision makers could actively adapt the institution to changing circumstances.

Second, if, on the other hand, the decline of institutions is desirable, but it takes too long for the institution to be fully removed, there is the problem of "cleanup." This occurs if novelty is introduced, but old institutions remain or are at least not fully abolished or replaced. To our knowledge, this has not been treated systematically in the literature. In some cases, this will be inevitable. For example, institutions linked to technologies such as coal-based electricity generation need to be maintained so long as the technology itself still exists. In other cases, transition periods occur to allow for a smooth transition from the old to the new. However, the longer the remnants of old institutions stay, the greater the persisting institutional complexity, associated with greater inefficiencies. A possible response, therefore, is to engage more actively in fully abolishing existing institutions. A policy instrument to prevent the cleanup problem in the first place is sunset legislation. This refers to laws that demand revision or removal after a given time, thus periodically providing for windows of opportunity for institutional change or termination (Geva-May 2004).

The essential point is that active decision making is required on whether a declining institution is still normatively desirable and should be preserved, or elements thereof, or whether it should be abandoned and eliminated sooner rather than later. A case in point is military conscription in Germany. German law stipulated a general conscription of male adults, with those unwilling to perform military service (Wehrdienst) instead allowed to perform alternative civilian service (Zivildienst) in social services such as hospitals and retirement homes. In post–Cold War Germany, the size of the federal army was reduced dramatically, greatly

reducing the number of required draftees. Among other things, this led to an increasingly loose application of examination rules to the effect that only a minority of physically highly capable candidates were drafted, thus leading to increasing injustice in the drafting procedure. Hence, over time, public opposition to compulsory service increased, with important questions arising around its sustainability for the future. The legitimacy of the Wehrdienst was therefore in serious decline, and a decision needed to be made about how to proceed in the future. In 2010, the federal defense minister commissioned a report providing recommendations for the modernization of the German military. It acknowledged that in its current state, the German military was "out of balance, too big, wrongly composed and increasingly old-fashioned" (Strukturkommission der Bundeswehr 2010). Despite initial doubts, in March 2011, the German government replaced mandatory conscription with a voluntary military service of between 6 and 23 months, open to both men and women.

This case can be described as one of "drift" in the sense of Streeck and Thelen (2005), in which the institution of conscription was initially not adapted to the changing circumstances dictated by a smaller army size. With growing opposition, the German government was faced with a decision to either re-establish drafting justice through drafting more men, e.g., at the expense of professional soldiers, or, alternatively, abolish conscription altogether, which is what happened. This decision was in no way inevitable, however, as illustrated by the example of Sweden, which has recently introduced conscription for both men and women. The case exemplifies how active and reflective decision making, involving an expert commission and public and parliamentary debate, successfully halted the unregulated and unsustainable decline of an institution.

Gathering from the evidence of the case, and going beyond, suggests to us the importance of reasoned and reflective societal dialogue to inform active decision making on whether or not to halt decline. This may involve techniques of scenario building or deliberative assessment (Adger and Jordan 2009, Loorbach et al. 2017).

DISCUSSION

As this tour d'horizon of productive functions has shown, there is no single body of literature that captures them all. Many of the pathways we describe have been mentioned in writings on ecology, organizational studies, economics, political science, anthropology, or sociology. Our purpose, therefore, was not to reinvent the wheel, nor to add another dimension of decay. Rather, we sought to identify and discuss some intricacies of the basic pathways, which are summarized in Table 2. In concluding our analysis, we point to some overarching issues for further discussion and reflection.

First, although described as distinct archetypes, the five productive pathways are, of course, not unrelated. On the one hand, they may serve as building blocks for typical sequences. For example, a major institutional change through purposeful destabilization may follow a crisis that reveals deficiencies of existing institutions that are so devastating that incremental adaptation and adjustment are deemed no longer sufficient. On the other hand, whether something is viewed as, for example, crisis response or as active dismantling may depend on the level of abstraction. Similarly, purposeful destabilization may happen in situations of already beginning decline. The notion of the reset button, discussed in the fourth archetype, bears some similarities to adaptation in the wake of crisis: In both constellations, inevitable institutional degradation is occurring, but in the latter, this appears through a focusing event, i.e., crisis, and typically relates to specific weaknesses revealed, whereas in the former, a gradual but thorough decline may suggest a rethinking to institutional regime actors. The cleanup mechanism, discussed in the final archetype, may also be relevant to purposeful destabilization. However, in the latter, the main focus is on how to achieve the destabilization as such, whereas in the former, decline is happening anyhow.

Second, a few metatopics emerge across the archetypical pathways. One concerns the issue of stability versus change, as indicated previously (e.g., see Table 2). Although we are mostly concerned with change as a feature of decline and destabilization, this cannot be conceptualized without considering stability as the other side of the coin. Thus, in the first two archetypes, there is a normative aspiration toward functioning, i.e., functionally stable, institutions; restabilization is an issue in archetypes 3 and 5 and most explicitly discusses the desirability of institutional decline versus stability. A second metatopic relates to innovation. Although we started from the observation of a biased preoccupation with innovation, the archetypes we presented are nevertheless interspersed with references to innovation. We find innovation in the course of adaptation after crisis, as innovation adoption in the course of learning from failure, as alternatives to a destabilized institution, and, most notably, as innovating in the face of inevitable decline. However, we highlighted that, at the same time, decline may be an inevitable, yet often neglected component of innovation as well: Innovating existing institutions will go hand in hand with overcoming or dismantling of those institutions, or at least part of them. Learning constitutes another metatopic, most notably in archetypes 1 and 2. Whereas the latter builds on the record of existing experiences, the former requires crisis as a focusing event to enable effective learning. Although learning in the wake of crisis is merely reactive, systematic learning in the second archetype requires a more active search for relevant experiences. However, we have deliberately left out a learning mechanism that is yet more proactive in targeting effective learning on the effectiveness and improvability of an institution: policy experimentation, potentially as part of an adaptive governance strategy (Koontz et al. 2015). Policy experiments, in the best case, succeed and then do not involve failure. However, arguably much of the literature on policy experimentation is too much concerned with how local "experiments" can be "upscaled" and mainstreamed, implicitly assuming their success. In this literature, including that on experimentation in adaptive governance, there is currently too little recognition that experiments may also fail. Only if the potential negative outcome of experiments is fully recognized will they serve an effective learning function, rather than one of merely piloting (see Sanderson 2002).

Both of these aspects, relations among and metatopics across the archetypical pathways, demonstrate how the individual pathways hang together. This reinforces our view that the productive functions of institutional failure and decline ought to be discussed in conjunction, as we propose.

Third, despite relying on a structural functionalist perspective, we acknowledge that politics, bargaining, and societal conflicts play

important roles in the archetypical pathways we present. None of the archetypes unfolds in a natural manner but can be interpreted as the instance or outcome of a process of societal bargaining. This may be most obvious in the archetype on purposeful destabilization or reflective management in the face of decline, which entails almost by definition conflict and societal struggle, but holds also for the other archetypes. Productive outcomes realized through learning from failure and adaptation in the wake of crises also require the introduction and negotiation of alternative ideas, knowledge, and perspectives and, hence, can be interpreted as the product of conflictive societal processes. Exploring the proposed archetypes through the perspectives of conflict theories may provide a means to bring closer together functionalist ideas strongly embedded in social-ecological and socio-technical systems thinking with core ideas of the social sciences (see Olsson et al. 2015, Hahn and Nykvist 2017)

Finally, we see that failure and decline cannot be discussed without explicit reference to normativity. Some failure is bad, other failures are desirable and intelligent. Our focus has been on the role of productive pathways for enhancing sustainability. Although sustainability outcomes are by no means automatic, we assume sustainability goals to be given (see Brundiers 2016). This is not unproblematic in the context of failure and decline. The sustainability of subsystems may come at the expense of higher order systems stability/sustainability: "Sustainability or increased longevity of components, be they cultural or ecological, may be limiting for the adaptation and sustainability of the whole" (Voinov and Farley 2007:105).

CONCLUSION

To conclude, we highlight two considerations, one conceptual and one empirical, that we deem important for future work. On a conceptual level, we have approached productive functions of failure and decline mostly from a governance perspective. In that we assume decision makers to be generally interested in sustainability and the common good, our approach is thus prone to the "problem-solving bias of governance" identified by Mayntz (2004). Others, such as Bovens and 't Hart (1996), Boin et al. (2008), Galaz et al. (2011), or Bauer and Knill (2014), have discussed the politics around failure, crisis, and dismantling, turning attention to the strategic motives of decision makers. Such considerations are essential for understanding how the potential of productive functions can be harnessed under real conditions. We would encourage fellow researchers to continue on this road of linking analytical strands of institutional change literature to the more intervention-oriented governance literature. In this context, it will be important for future work, as outlined previously, to more closely scrutinize the role of conflict, agency, and particular actors in the institutional change processes. Where our treatment of archetypical mechanisms has admittedly remained on a relatively abstract level, further research will have to disentangle institutional regimes, taking a microperspective on individual and collective actors and their potentially productive roles in institutional failure and decline.

Earlier work has found surprisingly little empirical evidence on the productive aspects of failure and decline (Derwort et al. 2018). We presented what to us appear the most promising archetypical pathways to harness the productive potential of institutional failure and decline. We hope that the conceptual distinctions made in this contribution will spark, facilitate, and structure further conceptual and empirical research. On a conceptual level, further refinement, expansion and/or simplification of the set of five archetypical pathways may further strengthen the framework. As regards empirical challenges, there is a clear need to understand under what circumstances the pathways will hold. How can institutions be built in a way that systematic learning from failure and institutional adaptation after crises happen? How and when are unsustainable institutions likely to be destabilized, paving the way for more sustainable solutions? As a research agenda, we suggest testing the propositions we have made by identifying empirical accounts on productive functions in the literature and the boundary conditions under which they have worked or not, respectively. In particular, we propose a large-N comparative (meta-)study of institutional dynamics along the outlined five productive functions, potentially across different countries and decades. This should allow us to gain a clearer understanding of the pathways at work and of the conditions under which institutional decline does indeed prove productive and where it does not.

[1] We define social structure as "stable patterns within society on a supra-individual (emergent) level" (Newig et al. 2010). Not all social structures are institutions; social structure also comprises the "relational structure," e.g., networks of actors.

[2] When we talk of adaptation, we should beware not to confuse this with the concept of adaptive management or governance. This draws on explicit experimentation to learn from policy interventions, i.e., trial and error learning, whereas we are concerned with unintended experimentation through crisis.

[3] In Kingdon's (1999) terms, this is where the stream of policy solutions meets a redirected politics stream and thus generates the momentum necessary for reform.

[4] From a different theoretical tradition, but to the same effect, social systems theorist Luhmann (1995) described social systems as systems with "temporalized complexity," in which regular disintegration paves the way for novel elements, such that a constant renewal of systems elements is ensured in a process of dynamic rather than static stability. In this sense, crises are seen as a constituent part of a functioning societal "immune system."

[5] A notable exception constitutes works on case selection that explicitly contrast successes with failures (see, e.g., Eisenhardt 1989, Kimmich and Villamayor Tomas 2018).

[6] Such forms of gradual institutional decline through non–decision making are similar to what Bauer and Knill (2014) term "policy dismantling by default," although they presuppose deliberate inaction by policy makers.

[7] Although seemingly similar to archetype 1, there is an important difference, namely, that in archetype 1, crisis does not jeopardize or outright replace the institution as such but merely reveals deficiencies that can be attended to.

[8] This parallels debates on "green drift," in which existing institutions are converted to more sustainable ones (Sousa and McGrory Klyza 2017).

Responses to this article can be read online at:
http://www.ecologyandsociety.org/issues/responses.php/10700

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