

# Path dependence and critical junctures: an urban-rural water sharing study

L. Nicol

*Department of Economics, University of Lethbridge, Canada*

## Abstract

Path dependence and critical junctures theory has evolved from first aiming to capture specific economic phenomena to explaining a host of social phenomena across a wide variety of disciplines. At this early stage in a planned research program, this paper will provide a literature review of path dependence and critical junctures. The subsequent study will focus on the history of urban-rural tension in the Calgary, Alberta region of Canada and the recent partnership that seeks to chart a new trajectory, which includes a vital water-sharing component. Paying particular attention to the potential access to water, the study will seek to determine whether powerful actors can vanquish an acrimonious path dependent past and carve out a new trajectory through what may potentially be a critical juncture.

*Keywords: water management, path dependence, critical junctures, regional governance.*

## 1 Background

There is a certain degree of urgency in improving water management in Alberta. A decade of unrelenting population and economic growth and the subsequent stress on water resources resulted in the termination of issuing new water allocations in 2005 in most of the southern part of the province. This means that existing water allocations need to be reallocated to new and existing users. Trading of water rights and water allocations is permissible under the province's *Water Act* and provides necessary flexibility. As irrigation controls 75% of all allocated water, it is expected irrigators will be an important part of the water reallocation process. Indeed a high-profile case occurred in 2007 involving the Western Irrigation District selling 2,500 dam<sup>3</sup> for a commercial development.



However, the plebiscite held in the irrigation district narrowly passed and public opposition and an (unsuccessful) appeal to the Environmental Appeal Board underscored the high degree of discontent.

Against this backdrop, 17 municipalities in the Calgary region embarked on a bold initiative to develop a long-range coordinated approach to land use planning and water-sharing. The group ventured into new, untested and highly conflict-ridden territory. Resentment among the participants goes back decades as power over development shifted from urban control (under the Regional Planning Commissions of 1963) to individual municipalities (under the *Municipal Government Act* of 1995). In recent years as the population in the region boomed, individual municipalities forged ahead with development, uncoordinated with Calgary, thereby “escalating regional tensions” [1, p.618].

Despite this acrimonious history, a long-term regional planning process began in 2006 under the auspices of the Calgary Regional Partnership. After almost three years of work, the Calgary Regional Plan (CRP) was unveiled. The key feature of the CRP was the inclusion of density targets that would reduce urban sprawl and manage resources ecologically. The CRP represented a major breakthrough in water management in the province and a unique situation where water would be moving from the water-rich city of Calgary, to rural users. Unexpectedly, at a meeting of the general assembly of CRP members in June 2009, the three large and powerful rural municipalities voted against the CRP stating: “...it is clear that there is hangover amongst the CRP partners about old attitudes. The old rural versus urban clichés that have for so long created conflict instead of cooperation between neighboring municipalities continues to rear their ugly heads” [2].

Under the province’s new Land Use Framework, regions are mandated to develop a regional plan. Thus, despite the disapproval by the three rural municipalities, the CRP was submitted to the Government of Alberta for a ruling. This ruling is expected in March, 2010, and will either impose the CRP on the region, or force the CRP members back to the table to resolve the outstanding issues.

Earlier legislation that created urban-rural tensions and current attempts to forge a new path represents a fruitful context for a study of path dependence and critical junctures. The Municipal District of Rocky View is the one large district of particular interest in this study as it has had the most acrimonious relationship with Calgary, yet is anxious to find new sources of water. Decades to ill-will appears to have become embedded and difficult if not impossible to reverse. However, the CRP presents an opportunity that may or may not succeed in setting the region along a new trajectory.

At this early stage in this research program, this paper will provide a literature review of path dependence and critical junctures. Given the research focuses on regional governance and municipal politics, attention will be given to their application to institutional change, broadly defined as structures and mechanisms of social order and cooperation governing the behavior of a set of individuals within a given human collectivity (Wikipedia). This work will ultimately help inform a more in-depth program of research. The paper is constructed as follows.



The proceeding section sets out the concepts of path dependence and critical junctures. The next section enumerates various criticisms of the concepts as well as potential solutions. Conclusions, including reflections on how path dependence and critical junctures can be used in the future study, are presented in the final section.

## 2 Path dependence and critical junctures

Although the concept of path dependence is a relatively recent phenomenon, only gaining prominence since the mid-1980s, its application has spread rapidly and broadly across many disciplines. What began as an innovative economic concept used to explain market failure has become ubiquitous, especially in social science research. Today some form of path dependence (select examples in brackets) is employed in economics [3–6]; politics and policy development [3, 7, 8], evolutionary economic geography [9–11], historical institutional development [12, 13] sociology [14–16] and management [17, 18]. With this widespread use came a myriad of interpretations and applications.

### 2.1 Path dependence

The genesis of path dependence resides in the discipline of economics with the seminal article by Paul David [19]. David showed how the emergence of touch-typing training programs during the 1890s created a demand for a standardized keyboard design. The “QWERTY” design held a marginal initial advantage over competing designs and became locked in, emerging as the industry standard because of this initial foot-hold despite later more efficient designs [20]. Generalized, this original concept of path dependence was associated with a type of market failure characterized by the early random adoption and subsequent lock-in of a relatively inefficient technology [19]. These processes are distinguished by technical interrelatedness, economies of scale and quasi-irreversibility of investments [21].

Path dependence is temporal, evolving over three distinct phases as described by Sydow et al. [22]. Phase I is characterized by a search process where choices are unconstrained. Once decisions are made, a dynamic self-reinforcing process is set into motion which eventually leads to a “deterministic pattern”. This decision stage is labeled a critical juncture because once chosen, it becomes progressively difficult to return to the point where multiple options were available. Phase II is as a period where options are increasingly confined but still available. The final transition to Phase III is characterized by lock-in where viable options become even more constrained.

Lock-in is described as a property arising when “sequential patterns of activity form a ‘groove’ from which it subsequently becomes difficult to deviate” [23, p.36]. More specifically, a system can become ‘over-committed’ to a particular technology, industry or institutional regime, as the case may be [9]. Blyth notes that where policy continuity exists in a path dependent fashion, it may be a function of “cognitive locking” and as such, is an “ideational” rather



than an institutional phenomenon [24, p. 23]. Wilsford [25] coined the phrase “behavioral lock-in” where certain behavior becomes embedded, gaining inertia and taking tremendous effort to change. Others characterize this state as being constrained by structures that confine and shape (institutions) and create lock-in through durable networks, which at the same time can result in instability when those networks change [25]. Weir spoke of “bounded innovation” where continuity is channeled but change is not entirely precluded [26]. Gulati [27] and Gulati and Gargiulo [28] observed that the path dependent character of inter-organizational networks means the previous ties among organizations increase the probability of an alliance between them in the future and that lock-in is likely to arise in the course of the development of the network [29].

Early on Arthur [30] augmented path dependence by applying it to more wide-spread technological adoption and the concept of increasing returns, coordination effects, adaptive expectations, and large setup costs that locked in particular technologies and excluded competitors [30]. Since then, Krugmen has focused on the way in which scale economies and positive externalities feed the process of industrial clustering while Arthur has gone on to study ways in which agglomeration externalities contribute to the concentration of firms in specific regions [31, 32]. Across a host of studies, regional development has been explained utilizing path dependence and related concepts (see for example [9]).

“Bygones are rarely bygones” [33, p.552]. In social dynamics, processes do not evolve in an unconditional way, but are “recursive” in the sense that former decisions have an impact upon those that follow [22], hence a path dependent process. In politics the notion of increasing returns was readily adopted by North [34] who argued that all the features identified by Arthur involving increasing returns in technology can be applied to politics. Institutions produce “massive” increasing returns in what North calls an “interdependent web of an institutional matrix” [34, p.95].

In a broad institutional context, new institutions often entail high start-up costs and considerable learning effects, coordination effects, and adaptive expectations [3]. Institutions “generate powerful inducements that reinforce their own stability and further development” [34, p. 255]. In politics, Pierson stressed, steps in a particular direction can trigger a self-reinforcing dynamic that accounts for sources of political stability. He further noted that once a particular path has been taken there are powerful incentives to stay on it [3]. Sydow et al. [22] stated that theories that point to practices or operational procedures in organizations, including concepts of “muddling through” [35], are related to the idea of path dependency. They stated: “These behavioral theories are sensitive towards the fact that history, as imprinted in existing routines and procedures for example, matter a lot in organizational behavior....Once underway, these routines and schemes shape decision-making processes in organizations and, eventually, cause organizational inertia....” [22, p. 12] Bednar and Page [36] argued that the best institutions for a particular society and its culture depend on previous institutional choices. The order in which institutions are implemented is significant, and existing institutions influence the performance of new institutions [37].

For Mahoney [37] and others like Pierson [3] the combination of some contingency at the front end and determinism at the back end of path dependent processes is what gives rise to what Thelen considers the most interesting features of path dependent social and political processes. These include unpredictability; sensitive dependence on initial conditions; non-ergodicity, where contingent events do not necessarily cancel out; and inertia, whereby once in motion, processes tend to stay in motion until an equilibrium or final outcome is reached (in [37]).

## 2.2 Critical junctures

Critical juncture has found wide-spread applicability in institutional research. Decisions made during such a juncture are deemed “critical” because such a decision leads to the creation of institutional or structural patterns that endure over time [37]. In studying nations’ historic trajectories, Golob [38] applies the notion of “exogenous shock” such as a war or international economic crisis that serves as a critical juncture that sets a country onto a new path. Paths can, however, be “dislocated” by strong political leadership or in response to pressures such as climate change or rapidly rising fuel prices [12]. Krasner’s [39] model, meanwhile, posits that institutional stability can be periodically “punctuated” by abrupt change, augmenting the notion of “punctuated equilibrium” developed by Kingdon [40] and Baumgartner and Jones [41]. So wide-spread is its applicability in research that the concept of critical junctures has been used to understanding the trajectories of national development in Latin America [42], to examining watersheds in American trade policy [43], to understanding the emergence of occupational welfare in Israel [44] (for extensive list see [45]).

In addition to the sources of change, scholars have contemplated the processes of change and the role of agency. Hogan and Doyle [4] believe that critical junctures which trigger significant change depend on “agents of change” – those who read a broad consensus upon, and subsequently consolidate around, one particular set of new ideas [5]. Garud and Karnoe [46] and Schumpeter [47] were first to challenge the notion that paths do not simply occur but can be deliberately brought about. Building on this argument, Sydow et al. [22] argued that agents can generate momentum for change over time. Rather than path dependence there is path creation and rather than increasing returns there is “positive self-reinforcing feedback” as well as social interaction of “more or less powerful agents” (p.28). In addition to these important agents, path breaking and path creating strategies are likely to require significant amounts of resources and “prolonged energy investment” (p. 34). Similarly, Torfing [48] spoke about providing more space for agency and social forces that carve out new trajectories. These he labels as “path shaping trajectories in a path-dependent context” that prevent old paths from reverberating [48, p.389].

Others have argued that institutional change occurs through gradual processes rather than abrupt critical junctures. Boas [13] claimed that in political institutions incremental changes can accumulate over time resulting in fundamental transformations. Thelen did not reject the concept of critical



junctures and path dependence, but suggested most forms of institutional change involve endogenous, rather than exogenous, mechanisms of change through “layering” and “conversion” (in [49]). Hacker [50] extended this line of reasoning, coining “policy drift” as slow alterations due to changing socioeconomic circumstances.

### 3 Criticisms and potential solutions

Breznitz [51] defined and differentiated the myriad of path dependence approaches, all of which are, to him, confusing. As a result of constant broadening and overextending of the meaning of path dependence, the term has a “floating meaning” and runs the risk of becoming an “empty heading” [51, p. 28]. Path dependence has become, within a short period of time, a widely used concept in social science but, Greener noted, studies also have remarkably little in common in terms of their conceptual framework or approach [52]. The process of path dependence to date largely constitutes a research field with a just emerging and still incomplete theoretical framework [46].

Pierson argued that the greater range of path dependence study offered by loosening the definition has come at a high price in analytical clarity. It is a victim of what Sartori has called “conceptual stretching” [53, p. 1034]. Bridges [54] believed that path dependence loses its vigor outside its home base of economics because the central mechanism in economics, the market, does not function elsewhere. However, even in the realm of economics, path dependence has been problematic. As Martin and Sunley noted, almost from the instant that David and Arthur began writing about path dependence, interpretive debates erupted and are still unresolved [9].

Other issues include: distinguishing between difference degrees or types of path dependence, the relative difference between near and distant events and the relative significance of big versus small historical outcomes [9]. How to identify the critical juncture, or the starting point of the analysis, can be problematic. Mahoney [37] stated “...the investigator is prone to keep reaching back in search of the foundational causes that underline subsequent events in the sequence” (p. 527). Others believe that path dependency is good at capturing constraint and inertia but not good at anticipating and explaining change [55]. Hess et al. [56] stated no empirical methods have been widely used that would allow general predictive capability, known as “path creation” in politics.

Equally important is the lack of criteria to assess a critical juncture compared to change that takes place incrementally [45]. As Mahoney stated, where does one draw the line as to what is and what is not a critical juncture? [37]. According to Sydow et al. [22], if we cannot define a critical juncture, the issue of path dependency becomes nebulous as we cannot ascertain the paths’ origins, leaving the approach in a quagmire [22]. But developing rigorous standards for studying critical junctures would be exceedingly difficult given the vast array of topics that utilize the concept [22].

According to some, critical junctures have remained under examined and insufficiently specified [45]. As a result, the perspective from which critical



junctures has been analyzed has varied greatly [45]. For example, the duration of a critical juncture may involve a relatively short period of time, for others, an extended period; it can focus on the underlying cleavages or crisis that precipitated a critical juncture or it can concentrate on the critical juncture itself [45].

The literature presents more issues than solutions to identifying and studying path dependence and critical junctures. A common definition is needed. Goldstone [57] suggested that path dependence be defined as:

“....a property of a system such that the outcome over a period of time is *not determined* by any particular set of initial conditions....rather....one in which outcomes are related stochastically to the initial conditions and the particular outcome...depends on the choices or outcomes of *intermediate events* between the initial conditions and the outcome” (p. 834).

Boas [13] proposed a “composite-standard-model of path dependence” that incorporate the three components of increasing returns, conversion and layering that work as “cogs in a machine working together in a complex fashion to constitute real-world processes of continuity and change” (p.48). Graefe [58] said there is a need to consider how institutions are not just constrained but how actors or “path makers” intervene to make new trajectories possible. Hess et al. [56] linked the concept of discourse analysis or dominant speakers to path dependence and how their story lines that have shaped new policy. Indeed, discourses especially help explain reinforcing processes in politics because “...political discourses are always built on historically prior texts so that the past strongly determines future political actions” [56 p. 4].

Hogan [45] proposed a framework for determining a critical juncture. First, there must be a generative cleavage – a tension that leads to the critical juncture. This cleavage can stem from large-scale public dissatisfaction of less dramatic events such as urban-rural divides. Second, the change must be significant, swift and encompassing or enduring, i.e. having a legacy [45]. The issue of what constitutes “significant” will vary with the subject but when they occur, they have large and enduring consequences. Change is not, however, long and drawn-out and the duration of “swiftness” will depend on the topic and probably be arbitrary [45]. Finally, there must be a legacy; without it there is no critical juncture [45]. Hogan and Doyle [4] add a predictive element to critical junctures. For there to be a critical juncture, they must be a paradigm shift. This occurs where agents of change are able to reach a consensus on a new set of ideas [59], described by some as a “discursive phase”; the “institutional battle”, where new ideas are “injected” into the policy domain, reducing barriers by coalition-building in this critical juncture [24, 57, 60].

## 4 Conclusions

Path dependence and critical junctures will have significant utility in gaining an understanding of the creation and persistence of animosity in the Calgary region that may prevent the creation of a critical juncture that could vastly improve



water management in the region. The foundation of the study could focus on what appear to be two critical junctures - the passage of the *Municipal Government Act* and the CRP. Applying Hogan's [45] conceptual framework, discussed earlier, one must first, determine if there was a generative cleavage or a tension that led to the critical junctures. Hogan [45] in fact identifies urban-rural divides as possibilities. Second, the critical junctures would need to be proven to be significant, swift and encompassing or enduring. In the case of the CRP there must be a paradigm shift. Path dependence would have occurred between these first and second critical juncture and as such particular attention would need to be paid to intermediate events and how they are related to the initial conditions in the creation of urban-rural tensions, the institutions and the path makers that ultimately perpetuated that environment. Such institutions and path makers would be significant in charting a potential new path. In terms of methodology, discourse analysis of dominant players and their power to shape new policy may be particularly fruitful. Analysis of provincial archives will assist in understanding the issues that led to the passage of the 1995 legislation and the urban-rural tensions that preceded and followed it. Existing planning documents trace the CRP's decision-making process to date. This research will also analyze the dynamics of the ongoing CRP process as it continues to unfold.

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