ABSTRACT

Deltas are generally recognized as vulnerable to climate change and therefore a salient topic in adaptation science. Deltas are also highly dynamic systems viewed from physical (erosion, sedimentation, subsidence), social (demographic), economic (trade), infrastructures (transport, energy, metropolization) and cultural (multi-ethnic) perspectives. This multi-faceted dynamic character of deltas is more and more recognized in the international literature and the focus on adaptation science in deltas is broadening from single issue climate adaptation to multi-issue adaptation. The multi-faceted character of delta areas warrants the emergence of a branch of applied adaptation science, Adaptive Delta Management (ADM) that is multi-issue and multi-faceted. This article describes and structures the emergence of ADM in science and its further development by professionals in The Netherlands. In this further development of ADM, professionals borrowed and combined multiple approaches from the policy and management sciences and lost track of their roots in science. This article connects ADM back to these roots in order to propel the further development of ADM through advances in adaptation science and facilitate a more structured discussion on developments in ADM.

Keywords: Adaptive delta management, adaptive policy making, adaptive management, strategic management, transition management

1. INTRODUCTION

Under the moniker of Adaptive Delta Management (ADM), adaptive policy making (Walker, Rahman, & Cave, 2001), as a culmination of research on uncertainty in policy analyses (Goeller et al., 1985; Lempert, Popper, & Bankes, 2002, 2003; Rosenhead, Elton, & Gupta, 1973), moved from science to practice within 10 years. This fast uptake of scientific work in policy analysis into practice was enabled by the development of the Dutch Delta Program. The Dutch Delta program used ADM as its main conceptual framework from its inception in 2010 (Delta Programme, 2011). The rapid development of ADM by the Delta Program was initiated and sustained by a close and ongoing cooperation between scientists from a number of Universities in The Netherlands, Deltares and the staff of the Delta Commissioner. In addition, the active dissemination of ADM by the Delta Program, both national and international, mainstreamed ADM into professional organizations. As a consequence, professionals took the lead in the further development and application of ADM. An inventory of publication on ADM in Scopus and Web of Science, and a Google search on ‘adaptive delta management’ (accessed in January 2015) reveals that there are only two scientific publication referring to ADM, while Google delivers 1450 hits. This strongly suggests that ADM is firmly rooted in advisory reports and policy documents, while its grounding into the scientific literature remains very limited. Further inspection of the professional literature indicates that definitions of ADM start to diverge considerably, and that ADM in practice lost its connection to its founding scientific work and as a consequence lacks a clear orientation for further development. The aim of this research is to structure the diverging developments of ADM and reconnect these to their scientific roots, in order to support the further development of ADM and its practical application in deltas around the world.

2. METHOD AND DATA

From the 1450 hits of a Google search on ‘adaptive delta management’, 36 documents addressing application of and research on ADM have been selected based on their relevance for the development of ADM and the scope of their content. Documents or websites that refer to or reformulate earlier publications were disregarded and so were Google hits that refer to seminars or conferences. The selected documents are analyzed in order to identify the scientific literature that is being used. This analyses uses both direct citations, as well as inference based on the use of concepts and terminology. This analysis of the branches of ADM revealed five relevant theoretical frameworks referred to or used in the professional (grey) literature. The five theoretical frameworks from the management and policy sciences are:
- Strategic management (Mintzberg & Waters, 1985)
- Adaptive management (Holling, 1978)
- Transition Management (Loorbach, 2010)
- Adaptive policy making (Walker et al., 2001)
- Dynamic adaptive policy pathways (Haasnoot, Kwakkel, Walker, & Ter Maat, 2013)

Strategic management is rooted in the management sciences but has exchanged utility maximization for bounded rationality (Simon, 1982). Adaptive Management focusses on adaptation through learning to increase the resilience of socio-ecological systems and is more analytic and substantial as compared to Transition Management that has a strong process orientation with a focus on sustainability. Adaptive policy making further developed policy analysis into a planned approach to adaptation. Dynamic Adaptive Policy Pathways has similar roots but does allow for even more adaptive capacity by not specifying a preferred policy pathway and using transient scenarios.

Around three third of the literature refers to one of the root concepts of ADM, while the remaining part refers to or implicitly uses multiple constructs. For a structured comparison we compared the management and policy sciences roots of ADM on three orientations assumed to be salient for ADM:

- Orientation on the present
- Orientation on the future
- Orientation on decision making

A brief analysis of recent publications in the scientific literature on the five root management and policy frameworks of ADM reveals that most of the theoretical and methodological contribution can be found in the Adaptive Policy Making and Dynamic Adaptive Policy Pathways (DAPP) domains, while scientific contributions in the other roots focuses on case studies, sector studies and international applications and less on theoretical and methodological innovations.

3. RESULTS

To support our analysis, we use two dimensions for each of the three orientations and positioned the ADM roots on these dimension in accordance with their theoretical characteristics. For the first orientation, orientation on the present, we used treatment of current values and preferences by the theoretical framework as salient dimensions. Values are defined as systemic properties (e.g. resilient system, sustainable system) that are relatively stable over time (Keeney, 2009) that do not permit trade-offs. Preferences are attributes of a strategy (e.g. construction of flood defenses, irrigation, water treatment) and preferences allow for trade-offs between strategies.

For the second orientation, orientation on the future, we use anticipation and vision as the two relevant dimensions. Here anticipation reflects the inclusion of the ability to learn about the future trough modelling and scenario exercises, while in non-anticipatory frameworks learning is, by definition, from the past. Vision indicates references to a desired future, often tightly connected to a value system, to be achieved through appropriate policies and actions.

For the third orientation, orientation on decision making, we use process and the continuum between the unicentric and polycentric perspectives on governance as salient dimensions. Process characterizes the strength of the orientation of the management and policy approach on the process of decision making. The governance dimension characterizes the approach as being tailored toward a single decision maker availing of all the resources required to implement the adaptive strategy or as embedded in a network in which resources are dispersed over numerous interdependent stakeholders. The results of this analysis are presented in Figure 1.

Figure 1 Characterization of the five root theoretical constructs of Adaptive Delta Management

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<th>Orientation on the present</th>
<th>Orientation on the future</th>
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From Figure 1 we obtain some interesting conclusions. First, we see that the theoretical roots of ADM show considerable differences. For orientation on the present and the future, the approaches cover the entire space. For orientation on decision-making, all approaches to a certain extend do incorporate a process approach, although for DAPP this is still
somewhat unclear. Although the DAPP approach is criticized for being overly uncinetic (Wise et al., 2014), we do not characterize DAPP as such, because uncineticism in not an intrinsic property of the DAPP approach proper. We do however agree with Wise et al. (2014) that ample attention for the process dimension of DAPP is required and is already the focus of ongoing research.

For orientation on the present, DAPP is at the lower end of its orientation on current values and preferences. The approach does not develop a base policy nor preferred pathway and integrates changes in values and or preferences as part of the uncertainty its tries to confront. This make DAPP stand out from adaptive policy making, which is like DAPP rooted in the policy analytic tradition that highly values objective and rational analysis, but develops a base policy as an interpretation of current preferences. At the other extreme, Adaptive Management stands out because it applies both preferences in its use of performance indicators in the management cycle and resilience as a systemic value. Transition Management refrains from the use of preferences and only focuses on sustainability as a system level value. Although Transition Management as a descriptive approach to governance does not necessitates this focus on sustainable development and sustainability is also not endemic in its theoretical roots in socio-technical transitions research (Geels, 2002), sustainability is, however, ingrained in most of its scientific publications.

Because of its focus on uncertainty and adaptation to future developments, the dimension orientation on the future is of particular importance for ADM. Here TM and AM orientate on a future that is visionary and value laden and do not anticipate nor explore future developments, while SM also refrains from visions. In contrast, AP and DAPP focus on adaptation while refraining from orientation on a vision of the future. Here DAPP is stricter because it does not opt for a single preferred pathway for adaptation. This orientation on the future is of specific interest when facing methodological choices in ADM applications in cultures that score on the extremes of the Long Term Orientation cultural dimension (Hofstede, 1983). The orientation on decision making is relevant in determining a proper ADM approach in relation to the decision making and political tradition and reality of global deltas.

4. Conclusions and discussion

Adaptive Policy Making (Walker et al., 2001) has found a fertile application domain in delta management. A Scopus, Web of Science and Google search on ‘adaptive delta management’ revealed that most of the current development of ADM takes place in professional and policy environments while scientific contributions are limited. Further analysis of the professional literature on ADM shows that these development in ADM are loosely and sometimes confusingly connected to their scientific roots in Strategic management (Mintzberg & Waters, 1985), Adaptive management (Walters, 1986), Transition Management (Loorbach, 2010), Adaptive policy making (Walker et al., 2001), and Dynamic Adaptive Policy Pathways (Haasnoot et al., 2013). Our analysis shows that the five theoretical roots of ADM diverge considerably in their orientation on the present, orientation on the future, and orientation on decision making. Difference that could bear significant consequences for the application and further development of ADM. In addition, the disconnection between practical and scientific development of ADM inhibits a fertile exchange between science and practice. This is especially relevant for the AP and DAPP, where rapid innovations are taking place. The limited integration of ADM with its roots in AM and TM values limits valuable methodological variety. This can be especially relevant for application outside The Netherlands, for example in cultures and countries that are at the lower end of the Long Term Orientation dimension of Hofstede’s theory on cultural dimensions. Finally we conclude that SM lacks an orientation on the future salient to ADM and as a consequence has not much to offer for ADM.

We therefore conclude that further research on ADM should focus on the re-integration of scientific and professional development in ADM related to TM, AM and DAPP. In addition, DAPP seems to be a very promising approach that is rapidly gaining ground as the primary focus in adaptation science, but requires a clear orientation on decision making and tooling for an interactive approach in addition to the current focus on fit for purpose malling (Haasnoot et al., 2014) and analytic innovations (Haasnoot et al., 2013; Kwakkel & Haasnoot, 2012). Furthermore ADM is primarily a Dutch approach. Therfore research is required to assess the applicability of ADM in other deltas. Here, comparing ADM to similar approaches in the United States (Rosenzweig et al., 2011), United Kingdom (Ranger, Reeder, & Lowe, 2013) and New Zealand (Lawrence, Reisinger, Mullan, & Jackson, 2013) could be a fruitful start. However, these examples focus on protecting what is there. In developing countries research on ADM need a stronger focus on socio-economic development as compared to climate change.

References


