



Cleaning up the big muddy: A meta-synthesis of the research on the social impact of dams



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ARTICLE INFO

Article history:

Received 21 December 2015
Received in revised form 26 February 2016
Accepted 29 February 2016
Available online 26 April 2016

Keywords:

Large dams
Hydropower
Social impact
Resettlement
Meta-synthesis
Framework

ABSTRACT

Scholars have been exploring the social impacts of dams for over 50 years, but a lack of systematic approaches has resulted in many research gaps remaining. This paper presents the first systematic review of the literature on the social impacts of dams. For this purpose, we built a sample of 217 articles published in the past 25 years via key word searches, expert consultations and bibliography reviews. All articles were assessed against an aggregate matrix framework on the social impact of dams, which combines 27 existing frameworks. We find that existing literature is highly biased with regard to: perspective (45% negative versus 5% positive); dam size (large dams are overrepresented); spatial focus (on the resettlement area); and temporal focus (5–10 years ex-post resettlement). Additionally, there is bias in terms of whose views are included, with those of dam developers rarely examined by scholars. These gaps need to be addressed in future research to advance our knowledge on the social impact of dams to support more transparency in the trade-offs being made in dam development decisions.

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1. Introduction

In recent decades, policy-makers around the world have mostly shunned hydropower. Particularly upon publication of the seminal report by the World Commission on Dams (WCD) in 2000, with its conclusion that “in too many cases an unacceptable and often unnecessary price has been paid to secure [dams’] benefits, especially in social and environmental terms” (WCD, 2000, p. 18), the rate of construction of dams declined (Schneider, 2013). Dams are an emotive and contentious topic partly due to the high potential for social impacts. Scudder (2011) estimates that more than 200 million people were displaced due to infrastructure projects in the previous century; possibly 80 million (40%) of these were displaced due to dams.

However, dams may now be about to make a comeback with major players reconsidering their stance. Chinese firms and banks have increasingly developed dams since the early 2000s, particularly in South-east Asia, seeking new profit pools (Urban et al., 2012, p. 313). The U.S. Department of Energy announced in 2012 that it aims to boost hydropower capabilities by as much as 15% in coming years (Pitt, 2013). The World Bank refocused on investments in hydropower projects in 2013 after largely abandoning the sector for about a decade (Schneider,

2013). A case in point is the 4.8 GW Inga 3 Project in the Democratic Republic of Congo (Sanyanga, 2015).

Scientists have explored the social impacts of dams since the 1960s (Adeniyi, 1976; Scudder, 1968; Shields, 1974; Singg and Webb, 1979; Sutton, 1977). Almost five decades have passed since Scudder identified a need for a systematic body of evidence to be developed via longitudinal studies utilizing hydropower development as a “quasi-laboratory [for accelerated change] within which to work” (Scudder, 1968, p. 169). Since then a wealth of studies on the social impacts of dams have been undertaken, conducted by scholars from a variety of disciplines – from anthropology to political science, human geography, engineering and even biology (Bakker, 1999; Beck et al., 2012; Lerer and Scudder, 1999; Tullos et al., 2013; Wang et al., 2013).

However, various scholars point out that many research gaps remain (Cerneja, 2004; Tilt et al., 2009; Vanclay, 2002). A reason may be the complexity of dams’ social impacts with a multitude of social impacts occurring over various time, space and value dimensions (on the complexity of the resettlement process: Bartolome et al. (2000); de Wet (2012) or de Wet (2006)). Indeed, dams’ impacts are more complex than those of other infrastructure projects in many ways. Dams frequently serve several purposes, e.g. electricity provision, irrigation and flood control. WCD (2000) estimates that one third of dams serve two or more purposes, with the share of multipurpose dams increasing in recent years. Furthermore, dams have a spatial impact far beyond the construction activities and the associated displacement, the key spatial impact areas of most infrastructure projects. Dams’ social impacts affect

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upstream populations, e.g. via restrictions on water use in order to fill the reservoir (Duflo and Pande, 2007), downstream populations, e.g. via benefits from irrigation water and flood protection; and entire countries, e.g. via electricity generation. Lastly, dams are among the most long-lived infrastructure projects, and social impacts can be considered over the entire operational timeframe. Dams may run for over 100 years, e.g. construction of Arizona's still functioning Theodore Roosevelt Dam was completed 104 years ago (SRP, 2015), whereas, for instance, a coal-fired power plant may only last for 30 years (Cleetus et al., 2012).

A single scholar or a small team of scholars usually cannot comprehensively study the breadth of these social impacts even for a single dam. Indeed, huge teams are required nowadays to complete commercial social impact assessments (SIA) which usually only consider dams' social impacts 5–10 years after project completion in the resettlement area. For instance, more than 100 experts were needed to complete the impact assessment for Myanmar's controversial Myitsone Dam (CPI, 2011, p. 1). Because scholars usually cannot employ the resources necessary to comprehensively study dams' social impact, particular components or dimensions of social impact are focused on. However, if no systematic review of the whole body of literature on the social impact of dams is carried out regularly (objectively showcasing which areas of social impact are over- or understudied), various scholars may focus on highly similar or identical areas of social impact. This may lead to various biases in the literature and our understanding of the social impact of dams.

As far as we are aware, no systematic review of the literature on the social impact of dams has ever been undertaken. This paper aims to provide such a systematic review. Via this review, research gaps in the current body of literature on the social impact of dams are quantified to objectively showcase which dimensions and components of social impact are truly understudied. Thus, this paper hopes to offer definitive guidance regarding future research on the social impact of dams.

The remainder of this paper is organized as follows. In Section 2, we explain why we chose to conduct a meta-synthesis on the social impact of dams (instead of a meta-analysis or narrative review). In Section 2.1, we outline how we developed a sample of the literature. Then we explain the chosen assessment framework for this sample in Section 2.2. Section 2.3 describes the coding rules adopted, Section 3 the findings of our analysis. Our results are discussed in Section 4. We summarize our argument in Section 5.

2. Methods

Meta-analysis, meta-synthesis and narrative review are three key approaches to literature review. Meta-analysis is considered the most robust approach to cleaning up “the big muddy” of a scholarly body of research.¹ During a meta-analysis, the scholar systematically develops a sample of articles assessing identical or highly similar research questions. Then, empirical findings of studies at hand are aggregated. Herein, the meta-analysis helps to maximize the sample size which, in turn, may enhance the external validity of previous findings (Glass, 1976). For the topic at hand insufficient quantitative evidence exists for a meta-analysis. Indeed, “what is striking [...], is the absence of systematic empirical evidence on how the average large dam affects welfare” (Duflo and Pande, 2007, p. 602).

The evidence that is available on the social impact of dams is largely from qualitative research, conducted by scholars from various disciplines. Therefore, we chose to undertake a meta-synthesis. During a meta-synthesis, the scholar also systematically develops a

sample of articles on identical or highly similar research questions. Then, findings in the article are assessed against a framework.

Via a meta-synthesis, scholars quantify which parts of a theoretical framework have not yet been investigated sufficiently offering guidance to future researchers (Cronin et al., 2008). Hence, a meta-synthesis may be able to help integrate and focus the literature on the topic at hand.

Both meta-analyses and meta-syntheses are replicable. Thus, they are the “rigorous alternative to the casual, narrative discussions of research studies” (Glass, 1976, p. 3), the narrative review. Neither sample selection nor sample assessment is usually systematized within a narrative review. As a result, the narrative review cannot be replicated and may lead to subjective, possibly misleading summaries of the research.

2.1. Creating a sample

The first step when conducting a meta-synthesis is the systematic creation of a sample. We generated our initial sample of articles on the social impact of dams via a three-step-process, conducted in early 2015. Firstly, keyword searches were undertaken in seven databases: Thomson Reuters' Web of Science, the University of Oxford Search Oxford Libraries Online (SOLO), Elsevier's Scopus, ProQuest, Columbia International Affairs Online (CIAO), OpenGrey and Anthropology Plus. Searches included any scholarly journal articles, grey literature, book chapters and books that featured combinations of the keywords – *social impact, social effect, human effect, resettlement, forced migration, agricultural productivity, dam and hydropower* – as well as various plural forms of the keywords at hand. No starting date was set. Searches were not restricted to any particular discipline. (To enhance readability, we refer to every piece of literature as an ‘article’ for the remainder of this paper. However, an ‘article’ may also encompass a report, book, book chapter or dissertation.)

Secondly, experts in the field were invited to double-check and possibly add articles to this initial sample (the anonymous reviewers of this paper also suggested to add four more pieces to this sample). Thirdly, experts identified key pieces of literature on the social impact of dams, the bibliographies from which were added to our sample. Bibliographies of recent dissertations on the topic were also included, as well as articles which are allegedly key pieces of literature on the topic according to the International Association for Impact Assessment (IAIA, 2014).

Overall, we included the bibliographies of Lerer and Scudder (1999); Strobl and Blanc (2013), and Tullos et al. (2010) as well as all articles published by the journal *Water Nepal* to our sample. These inclusions were based upon recommendations of experts in the field. Furthermore, we included the bibliographies of the recent dissertations by Matthews (2013) and Plummer (2013) as well as the bibliographies by Égré and Senécal (2003) and Tilt et al. (2009), key pieces of literature on the topic according to (IAIA) (2014), to our sample. Examples of key books/book chapters in our sample are *The Future of Large Dams* by Scudder (2006), *Silenced Rivers: The Ecology and Politics of Large Dams* by McCully (2001) or *Water Resources: Environmental Planning, Management, and Development* by Biswas (1997). We acknowledge, though, that our sample is likely biased towards peer-reviewed articles, while possibly not including all major books on the topic, since search engines such as Thomson Reuters' Web of Science do not index many books of interest to us. An example of a book not indexed by Thomson Reuters' Web of Science would be *The Future of Large Dams* by Scudder (2006). We note that our sample also includes WCD thematic reviews such as Bartolome et al. (2000) and Colchester (2000) which constitute part of the WCD knowledge base, the foundation of the report by the WCD.

Our initial sample based upon this three-step-process comprised 1641 articles. We then refined this sample, removing any

¹ We owe the phrase “cleaning up the big muddy” to Sleesman et al. (2012) whose meta-analytic review of the determinants of escalation of commitment inspired the methodological approach chosen in this paper.

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