Energy Research & Social Science 22 (2016) 69–78

Contents lists available at ScienceDirect

Energy Research & Social Science

journal homepage: www.elsevier.com/locate/erss

Original research article

The political ecology of hydropower: Social justice and conflict in Colombian hydroelectricity development

Viviana Martínez, O.L. Castillo*

Department of Rural and Regional Development, Faculty of Environmental and Rural Studies, Pontificia Universidad Javeriana, Transversal 4 No. 42-00 (Piso 8), Bogotá, Colombia

ARTICLE INFO

Article history:
Received 26 February 2016
Received in revised form 24 August 2016
Accepted 30 August 2016
Available online 9 September 2016

Keywords:
Eco-distributive conflicts
Socio-energy systems
Risk of hydropower projects implementation

ABSTRACT

This paper offers the identification of the hydropower energy systems events that have led to eco-distributive conflicts in the Colombian case and other countries of the region supported by the socio-energy systems framework and political ecology concepts.

The analysis of secondary information about the building and installation of thirteen hydroelectric plants between 1980 and 2010 in Colombia led to the identification of three consecutive time periods in which the conflicts generated by the installation of the mentioned plants exhibited distinctive characteristics.

The social and political effects of chosen energy systems on individuals, organizations and communities can be diverse and vast, but are usually neglected by decision makers and national policy designers to focus instead on economical and technological aspects. The lessons from past Colombian energy transitions could be integrated not only into the current national policy debates, but also into those of other countries in the region undergoing similar transitions. Doing so could help to avoid or minimize the social and political costs of energy policies, obtaining reliable energy systems which hopefully will remain in the longer term.

1. Introduction

The identification and analysis of the facts that have led to conflicts in the implementation of the Colombian hydropower energy system were supported by the socio-energy systems framework and the eco-distributive conflicts and energy justice concepts.

We understand hydroelectric expansion conflicts as ecological and distributive and hence, the offered analysis is focused on the power relationships of different actors around the appropriation and transformation of nature. Therefore, the eco-distributive conflicts analysis is focused on the identification of the main participating actors, their rationales and the legal or illegal tools used to enforce those rationales.

With regard to the conceptual framework, socio-energy systems design represents an opportunity to overcome obstacles such as the disconnection between energy policies with social and cultural sectors given the recognition that energy systems are embedded in these socio-political and cultural contexts.

The group of thirteen dams studied as part of this investigation, all comprise of hydropower plants installed between 1980 and 2010. All are categorized as 'generators', due to their installed capacity being equal or greater than 20 MW, which allows them to participate in the wholesale national electricity market. Table 1 shows both the opening year and the generating capacity of the thirteen dams – including the improvement phases of four of them: Chivor, Guatapé, San Carlos and Porce. This particular time period is justified as Colombia questioned its energy planning following the 1973 oil crisis and offered the first comprehensive energy studies and diagnostics of the sector in the early 1980s. In follow-on it has since adopted number of changes and policies in the sector that have had environmental, social, political and economical consequences until today.

The significance of the thirteen analyzed projects lies in the economic investment that they represented, in the engineering innovation, landscape transformation, social impacts and technological development, among other facts. In addition, they represent 55% of the current power capacity of the country and 83% of the hydroelectric production, adding to the wholesale national market 7455 MW (to the remaining 6100 MW) as installed capacity (calculations based on XM S.A. E.S.P. [95]).

* Corresponding author.
E-mail addresses: martinezviviana@javeriana.edu.co (V. Martínez), olga.castillo@javeriana.edu.co (O.L. Castillo).

http://dx.doi.org/10.1016/j.erss.2016.08.023
2214-6296/

Table 1
Analyzed hydropower plants.

Identified Periods	Name	Opening Year	Generating Capacity (MW)
The National Electricity Expansion (1970–1989)	Guatapé I	1972	280
	Chivor I	1977	500
	Guatapé II	1978	280
	Chivor II	1983	500
	San Carlos I	1984	620
	Salvajina	1985	285
	Guatrón	1985	202
	Betania	1987	540
	San Carlos II	1987	620
	Playas	1988	201
	Jaguas	1988	170
Privatization and Decentralization (1990–1999)	Guavio	1990	1150
	Tasajera	1993	306
Intensification of Violence (2000–2015)	Urrá I	2000	340
	Porce II	2001	405
	La Miel	2002	396
	Porce III	2010	660

Source: Based on XM S.A. E.S.P. [95].

This analysis has revealed two main drivers of the eco-distributive conflicts: the first one is the political and economic context where electricity sector was formed in Colombia. The second highlights the fact that the construction of mega dams has also been aligned with the interests of political elites and their expectations of a development model supported by economic growth, not only in Colombia, but also in other countries within the region. These conflicts display different characteristics across three distinct periods: the national electricity expansion (1970–1989), the privatization and decentralization period (1990–1999) and the intensification of violence period (2000–2015).

As is usual in analysis based on a timeline, in practice the narratives, policies and practices around energy expansion are not trapped in time capsules conveniently organized in decades. Ideas that first appear in one decade often gain strength in the following decade, having effects in a widespread line that goes from the immediate term to years after they were first put forward [21]. With that in mind, these three periods have served as temporal guidance for describing some facts that are part of the evolution of the Colombian electricity system, for explaining the energy policies adopted, and also for analyzing distinctive characteristics of the eco-distributive conflicts generated by them.

Notably while the establishment and evolution of the electricity sector in other countries of the region have their own characteristics, some of them show important similarities with the eco-distributive conflicts and energy justice issues that have arisen in Colombia. This suggests that similar dynamics to these conflicts may also be present in other countries of the world.

Hence, the remainder of this paper is organized around four sections of discussion: in the next, the evolution of the Colombian electricity sector is described. It serves as context to the establishment of energy infrastructure and energy policy since 1970. The following section exposes the conceptual framework used for this analysis, comprising of the principles of socio-energy systems and the concept of eco-distributive conflicts. Section four offers the identification of the ecological and distributive conflicts and justice energy issues that have arisen from the construction of these dams. The analysis here focuses on the sides in the conflicts, why they are confronted, and what their tools are to enforce their rationales. The last section sums up and concludes.

2. The evolution of the colombian electricity system since 1970

The Colombian panorama of energy production and consumption has been dramatically transformed over the past four decades. Table 2 offers data on the primary energy production, the primary energy supply available for internal consumption and the ratio between production and domestic supply that exposes the extractive character of the Colombian energy sector.

Table 2 data supports that the energy production model in Colombia has been export-oriented, neglecting attention to adequacy and internal energy efficiency issues in the last twenty years. While the destination of energy surplus is exports, involving economical dynamics, the establishment of the electricity sector to obtain those surpluses has resulted in significant territorial and

Table 2
Colombia Energy Production and Primary Energy Supply (1970–2013).

Time period	Production (Ktoe.) (*)	Total Primary Energy Supply (Ktoe.)	Production/TPES (**)
1970 (***)	18.984	5.937	3,20
1980 (***)	25.244	6.511	3,88
1990	48.179	24.223	1,99
2000	72.329	25.814	2,80
2010	105.931	31.203	3,39
2013	125.551	31.649	3,97

Source: (***) Calculations based on Garzón et al. [35] Annex 1 and IEA [44] Energy Balances Statistics.
(*) Kilo ton of equivalent oil.
(**) TPES corresponds to what is available within the country for the energy production and consumption (production + imports – exports – stock variations).