

# Technicalities of hydropower development: river basin management and territory control

*Nádia Matioli Yazbek Bitar*

Historical Laboratory of (Electro)Technology, FEE, Czech Technical University, Technická 2, 166 27 Praha, Czech Republic

bitarmat@fel.cvut.cz

**Abstract.** The scholars in the field of history of technology and geopolitics classify the twentieth-century as the one of the construction of power plants including large-scale hydroelectric dams. One correct analysis is that society pass to considers that technological progress can overcome the unstoppable features of nature. Likewise, the largest rivers systems in the world gradually were dammed and the named “technical landscapes” are noted. This constructions, as well as the agroindustry, mining, industrial sites and technological hubs boosted various sectors in the greatest world economies like USA. Engineering companies conquer the captive markets and the companies names and brands symbolises the technological power of their nations, sometimes even more than political or military power. The dam industry was and continues to be organized by large multinationals and most economically influential governments. One way that this takes place (international laws, inspection organizations, mutual agreements, financing, etc.) is the so-called technical assistance, but in developing countries, this assistance manifests itself in a critical and contradictory way. The article discusses how problematic this can be and how this actually guarantees more than management of the water resources or investments in the energy market as it is claimed, but the control of the territory itself.

**Keywords.** *Hydropower development, river basin, geopolitics, territory control, water management.*

## 1. Introduction: geopolitics and technicalities

The present work seeks to discuss the technical assistance in the sector known as the dam industry. It offers a critical look at this aspect often taken for granted for many scholars. Christopher Sneddon demonstrated that through one specific institution that worked abroad, the US Government favoured the participation of American companies in dam construction, training and know-how in this field, financing but above all, the *reconnaissance* of the territory as a geopolitical substratum. In this way, it is noted the participation in major engineering works, river basin inventories, prospecting of areas (site selection), soil and

geological research, hydroelectric planning and design (including irrigation for specific agroindustry); to supply raw materials and machines (such as turbines) and to operate in the energetic market, and so on, as features of a historical process that has been selectively built around the world throughout the 20th century. It is possible to consider that all this set of actions take places as a market that is being woven, according to geopolitical intentions and that it takes shape under the name of globalization. This article dialogues with two main authors: Milton Santos who question globalization as we understand it and as we observe it nowadays, and proposes another globalization, one that is made by peoples, not by transnational companies. The other author is Christopher Sneddon, who uses and problematizes the concept of technopolitics. This author is examining the complex technopolitical networks of water development that was design in the 20th century and, one can say, is still pretty much ruling nowadays. For the meantime, the technicalities that’s this article is suggesting, is addressed when referring to a complex co-production of technology and politics. The author concentrate analyses during the Cold War, when the United States water resource development agency named Bureau of Reclamation, was acting in all around the planet and the technical assistance was use as justification for more important issues carried out abroad, among others, with geopolitical goals, as for example, to stem the expansion of communism.

which the territory plays a role (which would facilitate or prevent) economic activities. Also, and on the other hand, how economic activities could influence changes in the territory. Thus, it is no mystery that local governments, through their executive and scientific institutions, and even academics, also played an important role in orchestrating this sector's way of operating.

As starting point, the analyze understands that the territory plays a role (which would facilitate or prevent) economic activities. Not less, and on the other hand, economic activities could influence changes in the territory. Thus, it is no mystery that local governments, through their executive and scientific institutions, and even academics, also played an important role in the way that dam industry operates.

Santos, points out that it is necessary to first understand the set of countries, then proceed to investigate the territorial

subsystems or, as he called it, the subspaces. To this end, here, we seek to discuss - as an object of study - some cases (or subspaces) where the American initiatives (from the Bureau of Reclamation) in the countries of the global south can be mapped in order to identify what justifies the presence of technical assistance. For that we are dealing specifically with the African countries. These are the places where the author identified the intentions of a geopolitical nature but could not go deeper into the specific theme analyses.

The intention is to unite the two lines of thought, as it opens up the possibility of understanding the space of the dams from their instrumental rationality degree, and, according to the technical assistance implemented there, allows us to demonstrate the function of technical, scientific and informational densities along Milton Santos proposed. Meaning finally, the possibility of understanding better the reasons for which we observe in these same spaces, regional disparities, social inequalities, deterioration of the environment, lack of political sovereignty or economic independence, among other asymmetries already taken as commonplace in the global south. The notion that divides the world between north and south, or between developed and in development countries, is useful once is possible to observe in the different countries different levels of modernizations by reading the industrial, social, political, and environmental landscapes nowadays.

“(…) For Milton, the specifics of the present are: a) the idea of technical uniqueness, referring to the domain of hegemonic techniques; b) the convergence of moments, that is, how local events become global due to the advancement of information techniques; c) the appropriation of technical achievements by global added value; d) the possibility of knowing the planet extensively and in depth, as a possibility of really know all places in the world. (RAMOS. S.F 2013 apud SANTOS, 1996 p.63)

A broader notion that this work takes in account concerns Milton Santos' formulations for the geographic science scope. One of the definitions he formulates for geographical space is that it serves as a functionalization of globalization. According to him, this space will be produced according to the demands of those who idealize it, to allow their needs to flow. In other words, the geographical space is an "inseparable set of systems of natural or manufactured objects and systems of actions, that are, deliberate or not". (SANTOS 1994, apud COSTA 2005).

It is important to highlight what he calls "uniqueness of technique", which refers to the ability to install any productive technical object anywhere in the world. To this end, we find here an affinity for what is known in relation to hydroelectric plants and the entire set of operations that are propagated from it - from the manufacture of the necessary technical objects to the way of building, operating and managing the hydroelectric plants. In this productive pattern, the particularities of the land and the social context in which the projects are inserted (also particularities) are mitigated, bypassed, they are called environmental and

social liabilities (reduced then to a synonymous of problems); and if they do not are disregarded of the order of planning and operation of these sites, they often are seriously undersized.

For the geographer Edward Soja (1993), there is a tendency for spatial inequalities would not be overcome, even when the economic development promised by these initiatives is somehow present. That is to say, he highlights that changes in the productive pattern had maintained the geographical inequalities as well the maintenance of immense profits on the part of transnational corporations, as has been occurring since the second post-war period. For him, this reaffirms geography through the emergence of spatiality, regionalization and regionalism, leading capital to review its spatial and locational strategies, which can be easily learned (SOJA, 10093 Apud COSTA 2002). That is to say, technological progress and development do not necessarily guarantee social and environmental sustainability..

The geographer Neil Smith (1988) also shares this conception regarding geographical reality. He believes that the combination of geographical inequalities is inherent in capitalist development, resulting in uneven development as a product and premise for capital. (COSTA, 2002). The strategies of territory control are directed towards favor certain companies to the detriment of others mainly in terms of profits, but also constitutes a strategic capital that is the knowledge of the territory itself, for better control of, in the distinct short, medium and long term. if we follow Sneddon's trail of thought, the control to which we refer here concerns the physical and material universe, as well as immaterial or metaphysical, and the field of thought, ideas and ideologies are also included in the big picture.

## 2. Bureau's geopolitically motivated technical assistance in Africa

After the general theoretical framework which we are dialoguing with are presented, the article focuses on the Appendix: Geographical Scope of Bureau of Reclamation 1933-1975 of Sneddon's book called: Concrete revolution: large dams, Cold War geopolitics, and the US Bureau of Reclamation; published in 2015. The book details aspects of activities and further analyzes in specific cases (such as in China, Ethiopia or Southeast Asia). Although the author offers extensive scope about the Bureau's activities, the clues left in the form of appendix, are helpful to draw some conclusions. However, it is important to highlight:

“They do reflect how the US State Department, and hence the Bureau of Reclamation, organized the globe according to preconceived notions of geography, ethnicity, political organization, and so on” (...) “A crucial component of the Bureau's geopolitically motivated technical assistance was to focus on “underdeveloped” regions” (SNEDDON 2015 p.159)

Sneddon explains that the vision of these actors simplified the planet between the developed and the

underdeveloped world. For each intervention in water resource development that was identified, there was a geopolitical argument that supported the actions in each location. For the period in question, it is verified the presence of American engineers in: Democratic Republic of the Congo / Zaire, Ghana, Ivory Coast, Kenya, Liberia, Nigeria, Somalia, Afghanistan, Bangladesh / East Pakistan, India, Korea (South); Laos, Pakistan / West Pakistan, Philippines, Sri Lanka / Ceylon, Taiwan, Thailand, Iraq, Iran, Jordan, Turkey, Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Haiti, Honduras, Mexico, Nicaragua, Peru and Uruguay. Due to the analytical cut the present study will only deal with African countries

As already noted, the activities of the American government through the Water Resource Development Agency - and its subsidiary - the Bureau, in fact, promoted the modelling and dissemination of technologies for the construction of large hydroelectric dams. In addition, the US tried to participate in the proposals for river planning and development in different parts of the world, most of the time with successes. In the period when the Cold War emerged in the global geopolitical context, technical assistance started to be considered a crucial tool for organizing the world according to the spectrum of influences that were in dispute. In Africa this drawing is exposed in the table below:

Locality	Period	Actor/ companies	Actions
Democratic Republic of the Congo/Zaire	1950-1960; late 1960s	American Embassy / TVA, Morrison Knudsen, Harza Engineering	Design; financing and construction;
Ghana	late 1950s; early 1960s; 1963;	Bureau of Reclamation / Kayser Aluminum	Construction; Commercial; political linkages;
Ivory Coast	early 1960s; 1965; 1967; 1973	Both countries presidents themselves; American Embassy / US Export- Import Bank	Financing of the dam; Geopolitical;
Kenya	1950s; 1964;1966 ; 1967;	Bureau of Reclamation; British engineering firm and British embassy in Washington Soviet Union / US Agency for International Development (USAID)	<i>Rreconnaissance</i> evaluation; irrigation systems; Feasibility Study; Geopolitical;

Liberia	early 1950; 1952; 1965; 1966; 1990;	Bureau of Reclamation; US embassy officials in Monrovia/ Utah Construction and Mining; European Investment Bank	Division of Water Control of the Liberian Government; <i>reconnaissance</i> study; dam project;
Nigeria	1965 to 1968; 1963;	Bureau of Reclamation; State Department - Department of Commerce; American embassy in Lagos / No American participation confirmed	<i>reconnaissance</i> investigation of land and water resources Political and commercial
Somalia	1954; 1963;	Bureau of Reclamation; US embassy / US Agency for International Development (USAID)	review of water resources development financial and technical assistance;
Tanzania	late 1966s;	Bureau of Reclamation / No American participation confirmed	expand the Geographical Scope of Bureau of Reclamation Activities; construction; irrigation; "administrative and legal reforms for water resource planning and development; recommendation for a basin authority to be created in the country

**Tab. 1.** The expressions are according to Christopher Sneddon’s book

Regardless of whether it occurred or not technical assistance, in certain cases the geopolitical interest was explicit, therefore no protocol or discourse rhetoric was needed. In addition, the Bureau often had to deal with situations where they were requested by the host countries themselves, and were encouraged to take on technical and planning tasks, other cases pointed out that the Americans recommended the creation of national institutions that deal with planning water resources (the case of Tanzania) and, according to the notes, the model adopted frequently copied the American way, using the same theoretical and practical models.

In the systematization shown in the table, we tried to identify what kind of action was carried out in these places, without, however, researching into the specific river basin, or specifying the name of each hydroelectric project. Instead, it was decided to highlight the affinities in terms of propositions, that is to say, what other intentions appeared as linked to the hydroelectric project? Thus, it was verified an intention to promote, together with dams, other productive projects; the commercialization of energy, as in the Congo and several proposals that foresaw the implementation of irrigation systems and, consequently, the agricultural project appears in a consortium way. Also, the imperative to build political linkages, or purely geopolitical interest in the foreign territory was noted as predominant. The case of Kenya seems symptomatic to think about the Cold War, where similarly like happened in Egypt ( case in which the author deals specifically in his book and is therefore not present in the appendix); the United States and the Soviet Union competed for funding and then received the expected compensation in this specific part of the globe. In these cases, the activities of the embassies go beyond diplomatic requirements and become a true business driver. the American embassy acted as verified in Congo / Zaire, Ivory Coast, Liberia, Nigeria and Somalia. In Kenya, the British also applied through their embassy (and with an engineering firm) to participate in the dam venture.

### 3. Final conclusions

How is possible that the knowledge about nature and technique can be serving a company or foreign interests rather than safeguarding the national's sovereignty? The systematization of the information above had exposed the companies, some of them are still in the engineering market today. It seems to us that they have developed a *planetary vocation*, as Professor Milton Santos would say. He drew our attention to how illusory the global market is because the specifics of the places are not so evident for the technical assistance to be fully realized. Further analysis in the reports of the research source, shows that rebellions occurred and that local forces (holders of knowledge about the territory) resisted the impositions of technicalities coming from outside. As noted in the case of Nigeria or Tanzania, despite the efforts undertaken, it was not possible, for some reason, to complete the American venture. Places also can rebel. The deregulation of international laws seems to facilitate such an intensive and concentrated interest in the territory of others, and the absence of adequate legislation for the countries surveyed is a remarkable fact detected.

In fact, discussing globalization seems to be necessary, if we look at this small range of American interventions in African territory in which the actors are repeated, dictating the productive scope, labour models, and local life as a result. Democratization, the guarantee of the participation of diverse agents does not occur. In fact, as the professor noted, there is a certain globalization that is not for people, but for companies. Some countries have the means to command and others are on the periphery, picture that seems to have not changed much since the cold war, until today.

## Acknowledgements

The research described in the paper was supervised by prof. PhDr. Marcela Efmertova at CTU under my second semester at the PhD program. I would like to thank all the help and support I had especially from her, my thesis adviser. I would also like to thank the support of Ing. Jan Mikeš associated professor working in the Department of Economics, Management and Humanities of the Faculty of Electrical Engineering, which also encouraged me to deeper the subject of study under development at this moment, in the thesis program and the academic extension activities. Also the head of the department prof. Ing. Jaroslav Knápek for the support very much appreciated in the working place.

## References

RAMOS, Soraia de Fátima. *Uso do território no vale do São Francisco: Sistema técnico agrícola da fruticultura irrigada*. GEOUSP - Espaço e Tempo, São Paulo, n. 34, 2013. Número Especial, p. 62-81.

RIBEIRO, Wagner. Costa. Globalização e geografia em Milton Santos. In: El ciudadano, la globalización y la geografía. Homenaje a Milton Santos. Scripta Nova. Revista electrónica de geografía y ciencias sociales, Universidad de Barcelona, vol. VI, núm. 124, 30 de septiembre de 2002.

SNEDDON. Christopher. *Concrete Revolution Large Dams, Cold War Geopolitics, and the US Bureau of Reclamation*. The University of Chicago Press Chicago and London. he University of Chicago Press, Chicago 60637 The University of Chicago Press, 2015.

## About Author

**Nádia BITAR** Degree in Geography from the University of São Paulo (2012) with Individual Graduation Work -TGI with emphasis on Human Geography. Has professional experience (between 2008-2015) in national and multinational companies in the area of environmental analyses involving licensing and strategic studies specifically related to the evaluation of socio-environmental impacts regarding constructions ventures and has also worked with territorial and urban planning. Holds the diploma Master Erasmus Mundus Techniques, Heritage, Territories of Industry (2018) coordinated by the Université Paris 1 Panthéon-Sorbonne (France), and carried out in consortium with Università degli Studi di Padova - UNIPD (Italy), and the University of Évora - EU (Portugal), with mobility internship performed in the Faculty of Electrical Engineering in the Czech Technical University of Prague (CTU). During the two years of master's degree, was supported with the annual grant of the *Comité d'Histoire de l'Electricité et de l'Energie* of EDF (Electricité de France). Has concluded the Master dissertation regarding the subject of landscapes and hydropower plants. Currently is in the first year of PhD in History of Technology at Czech Technical

University in Prague CTU. Work as an researcher in the Department of Economics, Management and Humanities of the Faculty of Electrical Engineering with the subjects of history of technology, heritage protection, landscape and territorial history; as well as with Geographical Information System - GIS and analyses regarding social and environmental issues.

