Participatory Water Management Strategies: Contributions for Canada from Brazil's National Water Resources Policy

Estratégias de gestão de recursos hídricos participativa: contribuições da Política Brasileira de Recursos Hídricos para o Canadá

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ABSTRACT

Canadian decision-makers are encountering escalating socio-ecological pressures to introduce a national water strategy. Canada lags behind other countries such as Brazil which has had a comprehensive, participatory, watershed-based national strategy for over a decade. Similar to Canada, Brazil is a complex, federal, resource-based economy. These two states are world leaders in terms of possessing the vast quantities of the world's fresh water supplies and in hydro-electric power production. In both cases, however, water abundance is predominantly concentrated in their northern territories with low population density, whereas in other geographical regions, the water demand associated with high population density lead to drought, shortages and social and economic inequalities. Despite these similarities, there are a number of differences particularly with respect to socio-economic and political structures. An examination of the Brazilian national water strategy offers some explanations as to why that federation has been able to develop innovative legislation as an important first step towards water security – a step that Canada has yet to take. It also offers some very useful examples and lessons about how a federal state such as Canada might introduce and implement its own integrative national water strategy.

Key-words: water resources; water management policies; environment; Brazil; Canada.

RESUMO

Os tomadores de decisão canadenses vêm sofrendo pressões socioambientais crescentes, por parte de diversos setores da sociedade, para a criação de uma política nacional de gestão de recursos hídricos. O Canadá, pelo fato de não possuir tal política, encontra-se, nesse sentido, distante de outros países como o Brasil. Este possui uma política nacional de gestão de recursos hídricos que tem como unidade de

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gestão a bacia hidrográfica e é baseada em princípios de decentralização e participação social, em vigor há mais de uma década. Como o Canadá, o Brasil é uma federação de economia complexa. Essas duas potências são líderes mundiais em disponibilidade hídrica e em produção de energia hidrelétrica. Em ambos os casos, as reservas de água mais abundantes estão concentradas nas regiões ao norte desses países, com baixa densidade populacional, enquanto que a maior demanda por esses recursos ocorre nas regiões onde há maior densidade populacional e maior concentração das atividades econômicas, localizadas mais ao sul e a leste, o que causa escassez de água e acarreta desigualdades socioeconômicas. Apesar dessas semelhanças, existem inúmeras diferençcas entre os dois países no que concerce às estruturas socioeconômicas e políticas. Apresenta-se um estudo da Política Nacional de Recursos Hídricos brasileira que permite indicar algumas explicações por que essa Federação pôde desenvolver uma legistação inovadora que desencadeou um progresso no gerenciamento desses recursos, uma etapa que o Canadá deve ainda alcançar. Este estudo apresenta, ainda, algumas lições e exemplos úteis de como um Estado federativo, como o Canadá, poderia criar e implementar a sua própria política nacional de gestão de recursos hídricos.

Palavras-chave: recursos hídricos; políticas de gestão da água; meio ambiente; Brasil; Canadá.

Introduction

Both Brazil and Canada are experiencing significant pressures on their water systems even though they (along with Russia) lead the world in terms of possessing the most abundant sources of renewable fresh water resources[1]. In Brazil and Canada, it was not until the 1970s that any concerted policy attention was directed towards protecting this crucial environmental good. At that time, it was becoming recognized that intensive water use for natural resources development and overall consumption was affecting its long-term sustainability. Since that time, participatory integrated water management plans (IWMPs) and strategies have been contemplated and applied in various policy settings. Such approaches, however, do not readily lend themselves to the political imperatives of these two federal countries, where jurisdiction over water is entangled in a complex division of powers.

Despite a number of social and political challenges, Brazil has been able to develop a well-conceptualized national water strategy based on a 1997 National Water Law. It is a decentralized, participatory, watershed-based management approach. As such, it is complex and requires the coordination of multiple governing jurisdictions. Prior to the 1997 law, some states had designed their own water management systems and organizations adding to the complexity. Overall, the strategy has yet to be satisfactorily implemented. It does, however, offer some useful insights for countries such as Canada, where various communities of interest have been contemplating how to best co-ordinate an effective water strategy in this country.

Participatory Water Management

It is broadly recognized in Brazil, Canada and elsewhere that sustainable water resource systems must be managed in an integrative way that recognizes their complex interactions with other valued ecosystem components (MITCHELL, 2005; ANA 2002). Increasingly, IWMPs include watershed-based participatory governance approaches (FRANCIS; WHITELAW, 2004; POLLOCK, 2004) which suggest that sustainable water management needs to include a broad diversity of stakeholders and civil society The goal is to teach people to live as "watershed citizens" (BRANDES; MAAS, 2006, p. 24). In both countries, the powerful hydro-electric sector has been a very important provider of energy and, historically, has been a dominating force in policy agenda-setting limiting the participatory opportunities for other communities of interest. Canada and Brazil (along with the Unites States) are the world leaders in hydro-electric energy production which has been used to support their staples-based economies (CANADIAN RENEWABLE ENERGY NETWORK, 2006). As such,

[1] Brazil, Russia and then Canada are the three world leaders with respect to possessing an abundant fresh water supply.

shifting the balance of power to watershed-based, participatory decision-making is a somewhat intractable problem.

In countries such as Brazil and Canada, divided jurisdictions contribute to the complexity to developing a coordinated strategy. That said, federalism may be more flexible institution allowing for a decentralized, participatory cooperative water management approach than would be the case with a unitary state. It could offer a tiered decision-making approach that is able to respond and adapt in diverse ways to the particularities of regional and local requirements. At the same time, federalism allows for higher levels of government to accommodate inter-jurisdictional imperatives where water bodies and rivers traverse political boundaries.

Canada does have a Federal Water Policy that takes a "cooperative" approach to national water management as well as many water protection acts and regulations (ENVIRONMENT CANADA, 2006). Yet, still absent is a well-integrated national framework which is needed for source water protection, and managing water withdrawals (BRANDES *et al*., 2005, p. 46). The Canadian Water Resources Association (CWRA) issued a press release in June 2008 stressing the urgent need for the initiation of a participatory approach to the development of a national water strategy – an imperative that was acknowledged by the federal government in its 2007 budget. The CWRA suggested that Canada could learn some lessons from other countries, including Brazil, that already had a national strategy in place (CANADIAN WATER RESOURCES ASSOCIATION, 2008). In contrast to Canada, despite the many challenges and problems inherent within the Brazilian federal political and social systems, it was able to introduce a comprehensive, participatory IWMP. In part, this is attributable to a different federal system, political culture and history. The Brazilian federal government, for example, has more authority over rivers that cross jurisdictional boundaries which are designated as federal rivers. Most importantly, the necessary political incentives were in place and from a socio-ecological perspective, the urgency that such a strategy be put in place was becoming glaringly apparent.

Historically, Brazil has struggled with serious water quality and quantity problems. Perhaps, this is why such concerted attention has been paid to it. Societal inequalities, widespread poverty, and the continuing inability of Brazil to implement its progressive legislation in many policy areas continue to plague the country (MONTEIRO, 2005). Water management is no different in this respect. By and large, Canada has been able to provide safe supplies of drinking water to the majority of its urban population. Nevertheless, worrisome recent events, particularly in rural and remote Canadian communities, have underscored the need for more cautionary approaches to water management. Brazil's innovative water initiatives deserve some consideration and recognition by highly developed countries such as Canada even if, as yet, these initiatives have not achieved all of their goals. The old assumption that northern or wealthier countries are inevitably the indisputable leaders in innovative environmental policy and legislation is a generalization that does not always hold water!

Water Challenges in Brazil and Canada

Historically, Canada has taken its water resources for granted given that it holds about one-fifth of the world's fresh water supply (BRANDES; MAAS, 2006, p. 3). Yet, the picture changes when one considers that only seven percent of that amount is renewable, and sixty per cent of its fresh water drains north away from the majority of its population which has primarily arranged itself in urban centres along the southern border (KREUTZWISER *et al*., 2004). Various Canadian municipalities are now encountering water shortages as well as some devastating water contamination events. In a watershed event, in the year 2000, an e-coli outbreak, a waterborne pathogen resulted in the deaths of 7 people and 2500 became ill in Walkerton, Ontario (ENVIRONMENT CANADA, 2008a). In 2004, 28 percent of Canadian towns and cities with municipal water supplies reported water shortage problems in the previous five years (ENVIRONMENT CANADA, 2008b).

Brazil has been dealing with water security issues for a much longer time even though it contains almost 13 per cent of the world's fresh water. Similar to Canada, assumptions of abundance led to unconstrained use of its water supplies as it built its resource economy (ANA, 2002, p. 5; LEITÃO, 2009). Yet, in this country too, water supplies are unevenly distributed with 70 percent concentrated in the Amazon Basin (see Figure 1). In the southeast, 47 percent of the population has access to only eight percent of country's total fresh water resources (ANA, 2002, p. 5). With its burgeoning cities and income inequality, the pressures are severe. Municipalities have been wrestling with the pressing challenge of providing safe and plentiful

residential water services. Even in the comparatively wealthy city of Curitiba, the Brazilian "ecological capital", the government struggles with how to deal with growing numbers of destitute people (over 12 percent of the population, approximately 327,000 people) who have built illegal *favelas* on vital water recharge areas that are being stressed beyond sustainable capacity (LIMA; MENDONÇA, 2001). In the past few decades, Brazil has encountered many other water management challenges; they include dealing with powerful entrenched interests such as the hydro-electric sector, a fluctuating economy, and problems of clientelism in the public bureaucracy (MONTERO, 2005, p. 19). Moreover, similar to Canada, it must deal with an uneven distribution of water resources throughout this vast, hydro-geologically diverse country (LEITÃO, 2009).

Federal Division of Water Powers and Responsibilities in Canada and Brazil

Federalism can serve as either a barrier to, or incentive for, innovative water policy change. Much depends on political will and the distribution of costs and benefits to governments. In the context of federalism, many factors can influence government action on the environment. Harrison (1996) argues that elevated public interest in environmental issues can provoke a competition between federal and provincial governments to "impress voters with their 'green' credentials" (HARRISON, 1996, p. 24). Canada's provinces are protective over areas such as the environment, given their proprietary jurisdiction over resources (HARRISON, 1996, p. 29). They can pass legislation on a wide array of water issues including pollution control, hydro-electric development, and water supply and use (ENVIRONMENT CANADA, 2006). The 1970 Canadian Water Act was the federal government's first major incursion into the water policy arena which was traditionally considered provincial jurisdiction (HARRISON, 1996, p. 65). As the environment became more salient on public agendas, the federal government increasingly asserted its authority for residual powers to make laws concerning "Peace, Order and Good Government". It also has specific proprietary and legislative powers that relate to water such as international water management, fisheries, navigable waters, some areas of environmental protection, and waters under federal jurisdiction (ENVIRONMENT CANADA, 2006). Canada's "cooperative" approach to federalism has led to the establishment of various bodies to coordinate inter-jurisdictional water issues ranging from local watershed based bodies such as the Ontario Conservation Authorities, the St. Lawrence Plan, and the International Joint Commission to manage the Great Lakes, among others. All these organizations have enjoyed a measure of success in various ways, but they do not constitute a national strategy, a commitment made by the federal government in 2007 (ENVIRONMENT CANADA, 2007).

Brazil, a federal republic, consists of 26 states, the Federal District (that includes the capital Brasilia) and approximately 5,600 municipalities. Brazil's population is about190 million and it has a surface area of about 8,513,000 square km, representing nearly half of South America (IBGE, 2007). The 1988 Constitution defines relations between the three levels of government: the Union (the national government), the states and the municipalities. Brazil's Constitution establishes water as a public good whereby the Union or the states have the exclusive prerogative to grant concessions. The concession gives the water user only a right to its use (BRAZIL, 1988). As a federal country, jurisdiction over water bodies can fall under either federal or state authority. Lakes or rivers that drain into more than one state or that straddle a border between states or with another country fall under the jurisdiction of the Union (i.e. the Federal government). Water bodies that drain in the interior of one state only are the jurisdiction of that particular state (SETTI *et al*., 2001). As is the case with Canadian provinces, groundwater falls under state jurisdiction (BRAZIL, 1988) although coordination is required when aquifers occur under more than one state boundary.

Brazilian National Policies and Legislation

Water rights legislation in Brazil dates back to the Water Code of July 10, 1934. It is still considered one of the model texts in Brazilian law. The process to develop a water management system began in the 1970s. The 1980s saw the introduction of environmental legislation for the hydropower sector. Globally, sustainable development was becoming a very influential concept and Brazil was no exception. International pressures and the influx of foreign capital stimulated policies that led to the funding of diverse environmental projects, particularly in large Brazilian cities (PRHB, 2002). The 1988 Constitution modified the text of the Water Code and placed it under the public do-

FIGURE 1 – HYDROGRAPHICAL NETWORK OF BRAZIL. SOURCE: ADAPTED FROM LEITAO (2009).

main (PNRH, 2002). The Constitution (in Article 21/XIX) mandated the development of a National Water Resources Management System (NWRP) (BRAZIL, 1988). The 1992 Rio Conference also played an instrumental role in the creation of Brazilian environmental legislation including those concerning the efficient use of water (LEITÃO *et al.* 2006).

According to Garrido (2007), three other key factors also contributed to heightened public demand for a Brazilian national water resource policy (NWRP): the general contamination of the water bodies, serious water occurrences such as floods in the South and droughts in the Northeast, and various water use conflicts throughout Brazil. The NWRP was heavily influenced by the international principles of sustainable development (LEITÃO *et al*., 2006) and by the French water resources management system which had a similar legislative structure and legal

framework for cooperation (GARRIDO, 2007). Inside the Brazilian bureaucracy, some government departments also stood to gain from increased funding from the central coffers if they had an environmental protection branch. As a result, it was not surprising to see a proliferation of environmentally-related projects. It was also important to the national government that it be able to demonstrate to the international community that Brazil was a progressive, environmentally concerned country. Federalism also played an innovative role in the formulation of the water policy. The State of São Paulo's, a more activist stated than others, already had a water policy that was more consolidated and advanced than the national one (GARRIDO, 2007). It had approved its State Water Law (7.663/91) on 30 December 1991. The States of Ceará (State Law n. 11.996, of 24 July 1992) and Minas Gerais (State Law n. 11.504, of 20 June 1994) (ANA, 2007) followed soon after.

Together the above factors, in combination with growing Brazilian civil society pressure, led to the creation of a national water act, Federal Law 9433 on January 8, 1997 (LEITÃO, 2006).The Federal Law is the primary piece of Brazilian water legislation (TUCCI *et al.,* 2003). While the law is comprehensive, the challenge lies in its implementation. The legislation is complex with wide-sweeping implications and requires numerous associated policy, legal and social reforms at national and state levels.

On July 17, 2000, The National Water Agency (Agência Nacional de Águas – ANA) was created under Federal Law (9984) (ANA, 2007). This act regulates ANA, a federal entity that is in charge of the implementation of the NWRP and the coordination of the National Water Resources Management System. In addition, it advises the states in the implementation of their state laws (MMA, 2007). ANA is also responsible for granting and controlling concessions in federal jurisdiction water bodies (Lei 9984/2000). The NWRP addresses watershed management and the multiple uses of water (MMA, 2007). It is based on the following principles (BRAZIL, 1997):

- water is a public common good and a limited natural resource with economic value;
- water management must be participatory and decentralized, involving participation by the government, the users, and civil society;
- priority must be given to human and animal consumption in periods of water shortage;
- water resources management should always allow for multiple uses of water;
- the river basin (watershed) is the territorial basis for the implementation of the National Water Resources Policy and the National Water Resources Management System.

The NWRP's objectives are three-fold: the attainment of qualitative and quantitative water availability for present and future generations; rational and integrated water resources management for sustainable development; and prevention of critical hydrological events (BRAZIL, 1997). The NWRP is responsible for creating water resources plans, classification of water uses (CNRH, 2007), granting of water use rights, establishing water charges, and providing a national water resources information system. Stakeholders that play an active role in water policy come from diverse backgrounds include water users (industries, farmers, water supply and wastewater treatment companies, hydropower companies, navigation (transport) companies, aquaculture and fisheries companies, tourism and recreation users, environmental demands) and members of civil society which include non-governmental organizations, universities, and scientific and technical institutions[2].

During the development of the NWRP throughout a five year process, stakeholders' interests were represented by the various formal sector associations and presented to the Members of the National Congress. Numerous public hearings were held throughout the country. Inter-governmental negotiations occurred during the process. The Deputies responsible for drafting the policy were present to hear members of the public and to discuss the various aspects of the future law (GARRIDO, 2007). Although many stakeholders from different socio-economic classes and groups participated, the Federal Government and the hydro-electric power companies were the most influential. The process was often contentious, with disagreement particularly evident between the Ministries of Energy and the Environment. Nevertheless, there was a general consensus about the need for a water policy that would establish the guidelines for sustainable water for the benefit and use of all Brazilians. Extensive discussions took place throughout the country for over five

[2] A number of the insights about the National Water Strategy and NWRC are based on the personal observation by the co-author of this paper who has served as the President of one of the technical chambers in the NWRC.

years (GARRIDO, 2007). It was approved first by the two Chambers of the Brazilian National Congress followed by Presidential approval in 1997. The federal treasury and government, the state governments provided extensive funding. Loans were also obtained from organizations such as the OAS, UNESCO and the World Bank.

The National Water Resource Policy in 2010

The balance of stakeholder power has changed since the inception of the NWRP. Prior to that time, hydropower companies dominated the water sector. Some of the changes might have come from the administrative changes within the Federal Government. A new Ministry of the Environment was acquired responsibility for water policy from the former National Department of Water and Electrical Energy. By separating water and energy responsibilities into two different departments, the hydroelectric power sector's influence in shaping water management was notably curtailed. In addition, non-government organizations participating in the national water policy gained more influence and continue to participate in the National Water Resources Management System (SINGREH). This is important given that the goal of the NWRP is to ensure that access to water is equitably distributed across all sectors and uses (CNRH, 2007). While that is the goal, it has yet to be achieved due to different hydrological and socioeconomic realities in the country. After the NWRP was instituted at the national level, those remaining states that did not have a state water law were required to establish their own pieces of legislation. Those states which already had some water legislation have reformulated them in accordance to the NWRP (ANA, 2007). Respective governing boards and agencies and watershed committees were established forming the National Water Resources Management System (SINGREH) (see Figure 2). Subsequently, several enabling agencies were created including the National Water Resources Council (1997), the National Water Agency (2001), watershed committees and watershed agencies (as of 1997) (PNRH, 2002).

It will take some years to see significant improvements in water quality because hydrological systems are complex and natural restorative processes take a long time. Moreover, changes in a country as vast and diverse as Brazil will also take time. Appropriate legislation is necessary but not sufficient. Political will and institutions need to be in place to implement the management system. The water policy system is still "under construction". The principle of decentralization is also present in Water Law, but not yet in the minds of many public decision-makers. The principle of participation has been achieved in many regions of the country. Implementation of the principle of integration is the most difficult task. Because of the diversity of situations, the results in terms of IWRM are not equal throughout the county.

In sum, water management reform in Brazil is based on decentralization, economic instruments, public participation and river basin management. The National Water Agency plays a double role: implementation of the SINGREH and the regulation of water use in Federal Rivers. This makes it different from traditional public services regulatory agencies. The water sector in Brazil has now a more equitable configuration where water users have the same rights to access water. An improvement of water quality in many water bodies has been experienced. Given the sizable regional hydrological and socio-economic differences throughout Brazil, it was quite remarkable that Brazil was able to achieve a national water strategy that included decentralized and participatory components. Moreover, the policy has raised much public awareness of water related issues all over the country. The level of communication among inter-governmental actors has improved significantly, although, some conflict exists internally. One of the most important achievements of the NWRP was the creation of the National Water Resources Council.

The National Water Resources Council (NWRC)

The National Water Resources Council (NWRC) or in Portuguese, the Conselho Nacional de Recursos Hídricos – CNRH, is the main decision-making entity of the National Water Resources Management System. The Federal Minister of the Environment presides over this council. It has 57 members that hold a three-year mandate. They represent all the major stakeholder groups active in the water sector composed of diverse representatives from the federal government; the state water resources councils; various stakeholders groups; and nongovernmental organizations all of which have some interest or expertise in water issues representing all sectors of Brazilian society on the national water agenda. (CNRH, 2007). The NWRC is the forum for discussions of major water issues, creation of policies, regulations, and resolution of water conflicts in Brazil (CAMPOS; STUDART, 2003). The

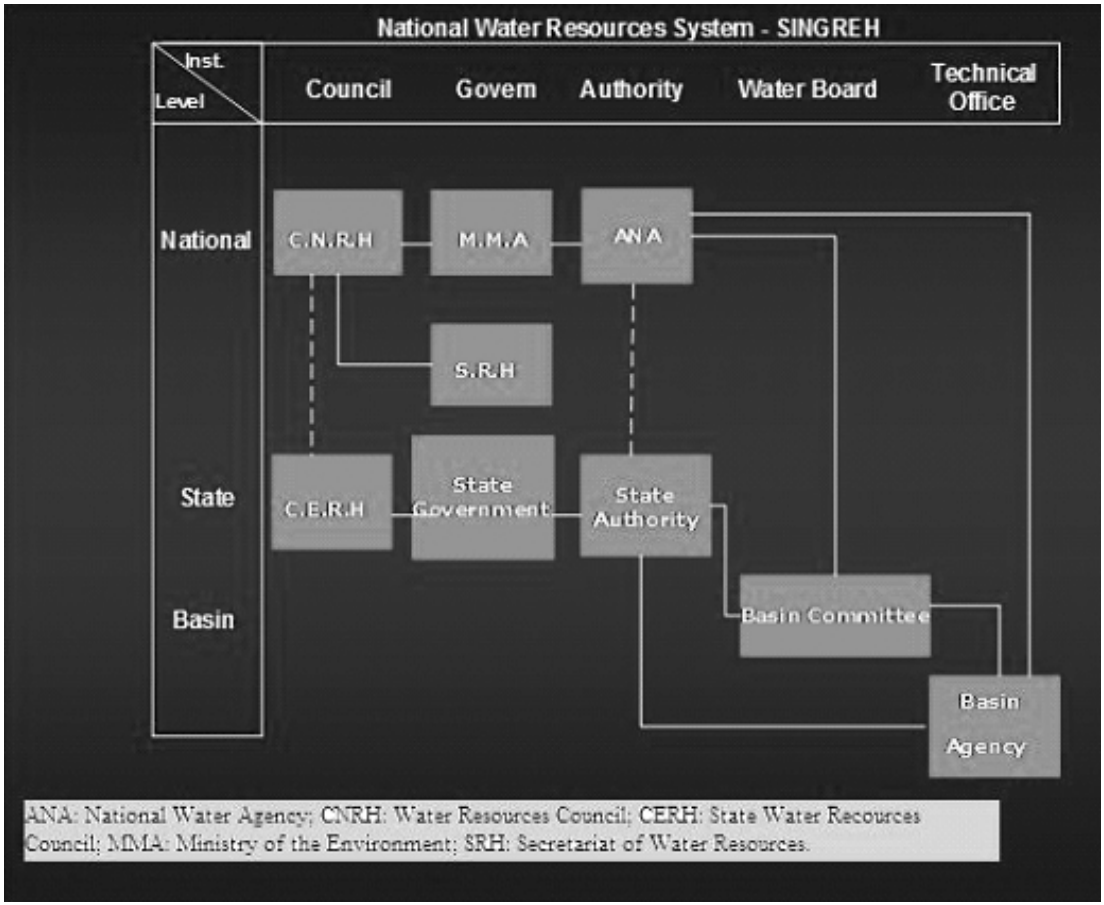

FIGURE 2 – NATIONAL WATER RESOURCES SYSTEM – SINGREH. SOURCES: ADAPTED FROM LEITÃO (2006) AND ANA (2007).

NWRC has a General-Assembly and 10 technical chambers in its structure in different areas. Several meetings of the technical chambers occur monthly in the national capital, Brasilia, and other parts of the country. NWRC General--Assemblies occur at least four times a year in Brasilia or when an extraordinary meeting is demanded by its President, the Federal Minister of the Environment (LEITÃO, 2005). The NWRC is an active democratic entity, "a water parliament" that holds with more than 120 meeting per year held throughout Brazil discussing all major water related issues.

The NWRC serves as the final arbitrator where there is conflict between states. It approves guidelines regarding the permit system for withdrawals and water use, and also for the implementation of bulk water charges. The Council's Executive Secretariat falls under the responsibility of the Secretariat of Water Resources and Urban Environment of the Ministry of Environment. The NWRC is at the apex of decision-making power in the NRWMS and has served as the arbitrator of many disputes. One example was the creation of the first federal river basin agency in the country: Paraiba do Sul River Basin Agency. Its watershed lies in the most industrialized region of the country situated between the two major Brazilian cities, São Paulo and Rio de Janeiro. As a result of its creation, improvements in water management were introduced such as water charges in the watershed leading to the implementation of a large sanitation project in the basin, thereby significantly improving Paraíba do Sul water.

An important achievement of the NWRC was the proposal by the NWRC CTEM (Education, Capacity Building, Social Mobilization and Information on Water Resources Technical Chamber) to introduce the Brazilian Water Decade (BWD), approved by the Council. After a series of discussions among the NWRC technical chambers, the Decree that created the BWD was signed by the President of the Republic in March 22, 2005[3]. The BWD text recognizes water as a strategically important resource. One of the BWD's objectives will be to foster and intensify the creation of policies, programs and projects that will promote the management and sustainable water use within Brazil, at all levels of society. It will also ensure the participation and cooperation of all the communities to the implementation of the objectives of the NWRP and international agreements that Brazil signs. The NWRC has proven its importance in the National Water Resource Management Strategy as the basis for a democratic, participatory and decentralized water management system in a vast country with many different social, economic, environmental and hydrological realities. As such, it can serve as a model for many other nations.

Lessons from Brazil for Canada

Canada has yet to implement an effective national water strategy. Unlike Brazil it was not facing the same degree of international, environmental, political or social pressures to address its water concerns nor does the federal government have the same degree of national authority over vital river basins. Yet the Brazilian recognition of the importance of water security from its participatory, strategic water resource management strategy that takes a nested watershed-based approach to its declaration of the "Brazilian water decade" offers a useful example to countries such as Canada. These countries have a number of features in common such as their vast and varied hydro-geology, an uneven distribution of water resources, and resource-based economies. They are also both federal countries with authority for water assigned to different jurisdictions. Brazil has managed to achieve a remarkable level of consensus in order to establish a participatory, decentralized water management strategy. It does, however, continue to struggle with social equality and implementation of its policy and legislative aspirations. Nevertheless, perhaps because of those challenges, it has developed some interesting, and promising approaches for water management. The weaknesses lie not in the concepts, legislation or federal system of government. Rather the difficulty rests in the deeply entrenched historical socio-economic and political challenges that are far deeper and more extensive than those in Canada[4]. The creative ideas contained in the Brazilian initiatives may not play out in the same ways as they would in Canada where authority is somewhat more decentralized and other political traditions have been instituted to coordinate inter-jurisdictional cooperation. Nevertheless, the National Water Strategy and water council are ideas well worth considering and possibly adapting in the Canada context and elsewhere.

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[3] This initiative to have Brazil declared "the decade of water" was based on a recommendation by one of this article's authors, who served as the President of the technical chamber.

[4] A number of remote Aboriginal communities are a notable exception.

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