STRUCTURING WATER GOVERNANCE REFORM: A CASE STUDY OF THE TROU-DU-NORD WATERSHED IN NORTHERN HAITI

STRUCTURATION DE LA RÉFORME DE LA GOUVERNANCE DE L'EAU: UNE ÉTUDE DU BASSIN VERSANT DE TROU-DU-NORD DANS LE NORD D'HAÏTI

ESTRUCTURACIÓN DE LA REFORMA DE LA GOBERNANZA DEL AGUA: UN CASO DE ESTUDIO EN LA CUENCA TROU-DU-NORD EN EL NORTE DE HAITÍ

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Abstract

Many national and subnational governments struggle to sustainably manage water resources. Accurately analyzing available water resources while distributing rights and enforcing responsibilities among water users is notoriously complex. These tasks are even more challenging when human or financial resources are scarce and regulatory capacities are low. As a result, water governance reform is often hailed as the solution to contemporary water challenges.

Unfortunately, water governance reform can be elusive, in part because water governance structures can take many different forms. This is true in the Republic of Haiti, where water challenges are numerous, and water management is often ineffective. In the Trou-du-Nord watershed in northern Haiti, in particular, institutional capacities for water management are low, and governance reforms are being considered by the watershed's stakeholders. This study provides an overview of Haiti's water governance framework, and proposes three institutional reform alternatives for management of the Trou-du-Nord watershed.

Keywords: water governance; institutional reform; Haiti.

Résumé

De nombreux gouvernements nationaux et infranationaux luttent pour gérer durablement les ressources en eau. Analyser avec précision les ressources disponibles en eau tout en distribuant des droits et en faisant respecter les responsabilités entre les usagers de l'eau est notoirement complexe. Ces tâches sont rendues encore plus difficiles lorsque les ressources humaines ou financières sont rares et les capacités de réglementation sont faibles. Par conséquent, la réforme de la gouvernance de l'eau est souvent saluée comme la solution aux problèmes d'eau contemporains.

Malheureusement, la réforme de la gouvernance de l'eau peut être difficile à realiser, en partie parce que les structures de gouvernance de l'eau peuvent prendre de nombreuses formes différentes. Cela est vrai dans la République d'Haïti, où les défis de l'eau sont nombreux, et la gestion de l'eau est souvent inefficace. Dans le bassin versant Trou-du-Nord dans le nord de Haïti, en particulier, les capacités institutionnelles pour la gestion de l'eau sont faibles, et les réformes de gouvernance sont envisagées par les parties prenantes du bassin versant. Cette étude donne un aperçu du cadre de gouvernance de l'eau en Haïti, et propose trois alternatives de réformes institutionnelles pour la gestion du bassin versant de Trou-du-Nord.

Mots-clés: gouvernance de l'eau; réforme institutionnelle; Haïti.

Resumen

Muchos gobiernos nacionales y de otro nivel (provinciales/departamentales) tienen dificultades para gestionar de forma sostenible los recursos hídricos. Analizar con precisión los recursos hídricos disponibles, al mismo tiempo que los derechos de distribución y el cumplimiento de las responsabilidades entre los usuarios del agua es una acción notoriamente compleja. Estas tareas son aún más difíciles cuando los recursos humanos o financieros son escasos y las capacidades de regulación son insuficientes. Como resultado, la reforma de la gobernanza del agua es a menudo aclamada como la solución a los problemas del agua contemporáneos.

Desafortunadamente, la reforma de la gobernanza del agua puede ser difícil de alcanzar, en parte debido a que las estructuras de gestión del agua pueden adoptar muchas formas diferentes. Esto es cierto en la República de Haití, donde los desafíos del agua son numerosos, y la gestión del agua es a menudo ineficaz. En la cuenca Trou-du-Nord, en el norte de Haití, en particular, las capacidades institucionales para la gestión del agua son escasas, y reformas en la gobernanza están siendo consideradas por las partes involucradas de la cuenca. Este caso de estudio proporciona una visión general del marco de la gobernanza del agua en Haití, y propone tres alternativas de reforma institucional para la gestión de la cuenca Trou-du-Nord.

Palabras claves: gestión y gobernanza del agua; reforma institucional; Haití

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INTRODUCTION

In October 2014, Florida International University (FIU) initiated a 27-month program to analyze water challenges in Haiti. Sponsored by the Inter-American Development Bank (IADB), the program has four primary objectives: 1) to analyze Haitian water laws and policies, and the institutions that implement them; 2) to identify gaps in hydrological data; 3) to model future risk scenarios for the Trou-du-Nord watershed; and 4) to create a water management plan for the Caracol Industrial Park and the Trou-du-Nord watershed.

A three-volume study of water governance in Haiti, completed in July 2015, represented the first of the project's objectives. It is intended to fill the gap of existing knowledge on water laws, policies, and institutions in Haiti, as well as to provide an assessment of issues, challenges, and opportunities for reform. The results of this study were presented to stakeholders in the Trou-du-Nord watershed, as well as national ministries, non-governmental organizations (NGOs), and intergovernmental organizations, in June 2015. The workshops validated preliminary results, while making clarifications and providing important insights that contributed to the final analyses presented below. Research and development efforts world-wide are not possible without meaningful stakeholder participation; this study is no exception.

The three-volume study was presented to the Inter-American Development Bank in July 2015. The IADB requested additional research that would propose an institutional structure for water management reforms in the Trou-du-Nord watershed. Accordingly, a fourth volume of the water governance study proposed three institutional reform alternatives (IRAs). This article presents the results of the fourth volume, including the proposed reform alternatives.

Each IRA includes a basic structural overview, a discussion of advantages and disadvantages, analogous applications of the structure in Haiti or around the world, and finally, a discussion of the legal challenges and reforms that would be needed to implement the IRA. While the government of Haiti has yet to endorse or formally pursue a reform alternative at the time of writing, the reform alternatives provide stakeholders with a framework from which to pursue institutional reform and water management in the Trou-du-Nord watershed.

METHODS AND BACKGROUND

Before considering water governance reform options in the Trou-du-Nord watershed, it is necessary to appreciate the water and governance context in Haiti, as well as the capacities of existing national and basin-level institutions. These conditions are investigated in depth in the three-volume study described above, but a brief overview is provided here.[2] As a starting point, Haiti has the lowest rates of access to improved water supply and sanitation facilities in the western hemisphere.[3] In 2002 Haiti was ranked last in the global Water Poverty Index,[4] and according to World Health Organization (WHO) data, it is the only country in the world whose access to sanitation facilities *decreased* from 1995-2010.[5] Those figures likely understate the situation considering the devastating impact of the 2010 earthquake near Port au Prince, Haiti's capital and largest city.

Haiti's water management landscape is dominated by small-scale agriculture, a water-intensive industry which by 2013 accounted for more than half of Haiti's labor force, eighty percent of total water withdrawals, and almost two-thirds of Haiti's land area.[6] The fragmented nature of small-scale agriculture may provide some measure of employment to Haiti's population, but presents enormous barriers to monitoring and regulation of water resources. These resources appear to be unsustainably exploited in part because very little information exists about water supplies and demands. In the Trou du Nord watershed in northern Haiti, for example, large-scale housing developments, mining operations, infrastructural improvements, and industrial manufacturing have either been planned or recently introduced despite the virtual non-existence of data on precipitation, climate, surface water flows, or groundwater that would normally precipitate such investments to ensure reliable water supplies exist for development.[7]

Today the Haitian state continues to suffer from low levels of human and financial resources, affecting regulatory development and enforcement capacities. The breakdown of effective governance creates many challenges, among them the ability to understand how a sector is organized, who has authority to manage it, and whether that authority is matched with capacity and political will. The Ministry of the Environment is statutorily responsible for most aspects of water resources management, including water quality regulation, policy-making, monitoring

2 An abridged version of the three-volume study was made available in July 2015. See Ryan Stoa, Water Governance in Haiti: An Assessment of Laws and Institutional Capacities, 29(2) Tulane Env.L.J. (2017).

3 Richard Geltin et al., *Water, Sanitation and Hygiene in Haiti: Past, Present, and Future*, 89 Am. J. Trop. Hyg. 665 (2013).

4 Peter Lawrence, Jeremy Meigh & Caroline Sullivan, *Water Poverty Index: an International Comparison*, 11 Keel Econ. Research Papers (2002).

5 World Health Organization: *Progress on Drinking Water and Sanitation: 2012 Update*, 39-55 (2012).

6 United Nations: Food and Agriculture Organization, *Geography, Climate and Population* (last visited Aug. 1, 2016), http://goo.gl/nCdxdG.

7 Henry Briceno, *Data Gap Analysis and Review of Available Modeling Data in the Pic and its Contributing Watershed*, 59 (2015).

and evaluation, inter-ministerial coordination, conservation, and enforcement. Some of these powers were explicitly inherited from the Ministry of Agriculture in recent years.[8] Its broad and ambitious mandate is unfortunately coupled with an acute lack of capacity in both management and technical expertise.

By contrast, the Ministry of Agriculture, Natural Resources and Rural Development has extensive resources (both human and financial) at its disposal, and exerts significant control over water resources management decisions, particularly those actions affecting irrigation and land use. It retains significant and nearly exclusive authority over irrigation and agricultural water management, although it has recently attempted to broaden its powers to include watershed management in general.[9] Its watershed management policies attempt to bring local governments into its policy regime, though from a legal-regulatory perspective, the Ministry of Agriculture has little statutory support for its role in establishing water resources policy.

The Ministry of Public Works, Transportation, and Communication is responsible for water supply, sanitation, and hygiene through its *Direction Nationale de l'Eau Potable et de l'Assainissement* (DINEPA - National Directorate for Water Supply and Sanitation),[10] a poorly funded agency tasked with implementing the 2009 Framework Law on Water Supply,[11] coordinating donor assistance, regulating water service providers, and facilitating decentralization of water supply management. The Ministry of Planning and External Cooperation plays a coordinating role between the various government ministries, as well as the multitude of donors and donor-funded projects. Of particular interest is the *Comité Interministériel d'Aménagement du Territoire* (CIAT – Inter-ministerial Committee for the Management of the Territory),[12] a committee charged with coordinating actions among Ministries. The CIAT is composed of the Ministries of Agriculture, Environment, and Planning, as well as the Ministries of the Interior, Public Works, and Finance. It is chaired by the Prime Minister, and has the potential to be a strong voice in setting water policy. A Technical Execution Unit (UTE) of the Ministry of the Economy and Finance also oversees the administration of projects affecting water resources, such as the Caracol Industrial Park in the Trou-du-Nord watershed.

In principle Haiti has embraced decentralized water management policies, which promote water management and service delivery at the lowest appropriate governance level. Accordingly, the national government has promulgated several laws transferring authority over water resources (including water supply, sanitation, and hygiene, and the development of environmental action plans) to local territories (including Sections, Communes, and Departments). However, the legislation has not clearly articulated a coordinated or strategic direction for water resources management, and has not provided local institutions with the funding or human resources necessary to carry out a successful and sustainable decentralization strategy. The private sector also plays a large role in water management. Private companies offering to build manufacturing plans and provide foreign investment in Haiti have significant influence over local and national governmental affairs, and can demand water rights or shield themselves from prosecution.

Institutional capacities in the Trou du Nord watershed in northern Haiti suggest that most agencies and stakeholders have neither the human nor the financial resources in place to fulfill their mandates. Some, however, such as DINEPA's local representatives or the University of Limonade, are relatively well-staffed and exhibit the continuity of presence needed to justify targeted capacity building efforts. Others, such as the sections and communes in the region, may have low levels of capacity in water resources management but merit engagement in order to secure broad participation in water management planning efforts.

The Trou du Nord river is located in the Trou du Nord Arrondissement, a subdivision of the Northeast Department of Haiti. The Arrondissement contains four communes: Caracol, Saint Suzanne, Terrier-Rouge, and Trou-du-Nord.[13] These communes comprise the local government bloc of stakeholders most integral to a participatory water management planning strategy, as they represent the core geographic regions of the watershed, while exhibiting a level of regulatory and management activity that lower levels of government (i.e., sections within the communes) lack. For the most part the four communes do not employ any full-time staff dedicated to water resources, though some activities fall within the broad scope of water management. More important, perhaps, is the local support and buy-in that would be needed from each commune to effectively carry out a water management plan that modifies the status quo in any meaningful way.

To implement decentralized policies, national ministries created regional offices, with staff in place to represent the ministry and carry out its mandate. Local representatives of national ministries in the Trou-du-Nord watershed are therefore a potentially fruitful partner, in the sense that they can marshal

8 Ministry of Agriculture, Natural Resources, and Rural Development: Official Site (last visited Aug. 1, 2016), http://goo.gl/kpUy8K.

9 *See* Ministry of Agriculture Watershed Management Policy (1999).

10 National Directorate for Water Supply and Sanitation: Official Site (last visited Aug. 1, 2016), http://goo.gl/VbeXaP.

11 *See* Framework Law on Water Supply (2009).

12 Committee for the Management of the Territory: Official Site (Aug. 1, 2016), http://goo.gl/QgyJsF.

13 Haiti-Reference: Districts and Cities of Haiti (last visited Aug. 1, 2016), http://goo.gl/ac7XOJ.

ministry resources toward local initiatives, while remaining knowledgeable of conditions on the ground. Unfortunately there is a stark contrast between the regional capacities of DINEPA and the Ministry of Agriculture, who are well-staffed in the region, and the Ministry of Environment, CIAT, and UTE, whose presence is marginal to non-existent.

Perhaps the most significant development for the Trou-du-Nord watershed in recent history has been the construction and operation of the Caracol Industrial Park. While the park has yet to reach full capacity, it is already making an impact in the region.[14] As a large apparel manufacturer, the Park represents both a challenge and an opportunity. A challenge because the scale of industrial and economic development projected for the Park at full capacity may have negative impacts on the watershed's resources. Water withdrawals may reduce freshwater flows in the Caracol Bay estuary, pollutant discharges may degrade water quality, and forest clearing may increase the risk of flooding. Fortunately these risks can be mitigated, in part due to the opportunity the Park represents for the watershed. With significant funding from the IADB, United States Agency for International Development (USAID), and foreign investors, the Park has the financial resources to carry out the watershed studies, monitoring programs, and mitigation projects that the aforementioned government officials cannot. The Park's dual nature as both threat and solution therefore makes it a vital stakeholder in the development of a watershed management plan.

The State University of Haiti's Limonade campus opened in 2012, with $30 million of investment contributed by the Dominican Republic.[15] It is the most modern and well-equipped university campus in northern Haiti, and sits less than ten kilometers from the Trou-du-Nord river. While the academic functions of the university remain under development, the professional staff and students represent a promising partner for water management planning in the region. While the university does not directly engage in public water resources management, it has some capacity to contribute to management planning.

Field research conducted on institutional capacities should be understood in context. Previous phases of this study provided a snapshot of existing capacities as of 2015, but capacities shift from year to year.[16] Feedback provided suggests that the existing capacities reflect long-standing limitations in water governance – the dominance of the Ministry of Agriculture vis a vis the Ministry of the Environment, for example, has been the norm even since the Environmental Management Decree transferred many powers to the Ministry of the Environment. In addition, while the institutions analyzed above were limited in their abilities to carry out sustainable water management policies, not to mention their statutory mandates, the deficit in human and financial resources is being periodically filled by the multitude of international NGOs and foreign donors in the region.[17] These organizations engage in a variety of water management activities, including drilling wells, building latrines, conducting research, providing training, and supporting government offices.[18] While influential, they were not the focus of this study in part because a robust water management plan for the Trou-du-Nord depends most crucially on leadership and engagement from domestic stakeholders.

INSTITUTIONAL REFORM ALTERNATIVES FOR WATER GOVERNANCE IN THE TROU-DU-NORD WATERSHED

The results of this study form the basis for the creation of an institutional structure that will carry out a water management plan in the Trou-du-Nord watershed. The Florida International University approach adopts a participatory approach, in which the stakeholders affected by, and affecting, water management in the region are full participants in the concept, design, planning, and implementation phases of the water management plan. A participatory approach is advantageous because stakeholders are likely to settle on a management structure that is realistic, while the participatory process increases the likelihood that stakeholders and communities feel a sense of ownership over the process and plan.

That being said, it is clear from the capacity assessments that absent intervention and external support, existing mechanisms do not exist to create an effective water management institutional structure in the Trou-du-Nord. As detailed above, communes, local ministry offices, and other stakeholders such as the Caracol Industrial Park and Limonade University have a critical role to play in the management of water resources in the watershed, but existing capacities are not sufficient to create a robust institutional management mechanism.

Accordingly, three Institutional Reform Alternatives (IRAs) are provided below. Each is designed to carry out water resources management activities in the Trou-du-Nord watershed, including hydrological

14 For contrasting views on the early returns of the Park, see Mary Anastasia O'Grady, *Hillary's Half-Baked Haiti Project*, The Wall Street Journal (Jan 11, 2015), http://goo.gl/rGTYEo; and Henri-Claude Muller-Poitevien, *A WSJ's Columnist Disregarded About Haiti. . . The Facts*, The World Post (Mar. 14 2015), http://goo.gl/BhW9Dq.

15 Haiti Officially Opens Roi Henri Christophe Campus in Limonade, Caribbean Journal (Sep. 22, 2012), http://goo.gl/0ExuIL.

16 For a snapshot of Haiti's shifting capacities across a variety of indicators, see The World Bank: Haiti – World Development Indicators and Global Economic Prospects (last visited Aug. 1, 2016), http://goo.gl/pTbG4g.

17 *See,* e.g., Madeline Kristoff & Liz Panarelli, *Haiti: A Republic of NGOs?*, 23 United Institute of Peace Brief 1 (2010); and Kathie Klarreich & Linda Polman, *The NGO Republic of Haiti*, The Nation (Oct. 21, 2012), http://goo.gl/yRPcwr.

18 The institutions canvassed reported working with the IADB, USAID, FAO, EU, Haiti Outreach, and Living Water International, among others.

modeling, stakeholder engagement, and monitoring and management of water quality. Each IRA includes a basic structural overview, a discussion of advantages and disadvantages, analogous applications of the structure in Haiti or around the world, and finally, a discussion of the legal challenges and reforms that would be needed to implement the IRA. The IRAs are intended to provide stakeholders with a framework from which to pursue institutional reform and water management in the Trou-du-Nord watershed.

A. CIAT-led Inter-Ministerial Management

As briefly described above, the *Comité Interministériel d'Aménagement du Territoire* (CIAT – Inter-ministerial Committee for the Management of the Territory)[19] is a committee charged with coordinating actions among Ministries. The CIAT is composed of the Ministries of Agriculture, Environment, and Planning, as well as the Ministries of the Interior, Public Works, and Finance. It is chaired by the Prime Minister, and has the political support necessary to be a strong voice in setting water policy and coordinating water management. In fact, one of its explicit components is watershed management,[20] and as such, the CIAT is well-placed to take up inter-ministerial leadership of water management in the Trou-du-Nord watershed.

1 The Structure

A CIAT-led inter-ministerial management structure for the Trou-du-Nord watershed would most logically mirror the institutional structure of CIAT on the national level. In other words, a ministerial committee composed of representatives from the Ministries of Planning, Interior, Public Works, Agriculture, the Environment, and Economy would be responsible for setting Trou-du-Nord water management policy, approving financial allocations, and monitoring the technical committee. Because watershed management is closely aligned with the mandates of the Ministries of Agriculture, Public Works (DINEPA), and the Environment, these ministries would likely play a larger role in the work undertaken by the inter-ministerial committee. This is especially true for DINEPA and the Ministry of Agriculture, as they maintain the largest presence in the watershed.

The technical committee would be responsible for day-to-day operations of watershed management, including monitoring of water quality, withdrawals, hydrological modeling, and balancing flow levels with the demands of the various basin stakeholders. The technical committee would be composed of, or at least work closely with, CIAT's national division for watershed management, the Cellule Bassins Versants et Gestion des Ressources en Eau, as well as the Centre National de l'Information Géo-Spatiale (CNIGS). In addition, the technical committee would be composed of representatives from existing stakeholders in the watershed, including the communes of St. Suzanne, Caracol, Trou-du-Nord, and Terrier-Rouge, as well as the Société Nationale des Parcs Industriels (SONAPI - National Society of Industrial Parks) and representatives of the Caracol Industrial Park and Limonade University.

At a minimum, the technical committee would be composed of hydrological engineers, modelers, geologists, and other experts needed to effectively manage the watershed. Given the limited size of the Trou-du-Nord watershed the technical committee may not require a daily operations staff of dozens of experts, particularly if the technical committee's work is supplemented by periodic contributions from the inter-ministerial committee and stakeholder representatives. Nonetheless, the technical committee requires qualified experts to manage the daily demands of watershed management.

2 Advantages

The CIAT-led inter-ministerial approach confers one major advantage over the two reform alternatives described below: CIAT and its participant ministries already exist and work together on a mandate to manage watershed resources. Therefore, a CIAT-led institutional structure requires little policy or legal reforms to be put into place (see below), and takes advantage of existing inter-ministerial relationships. This approach would simply apply the national CIAT model to the Trou-du-Nord watershed, allowing the institution and stakeholders to dedicate time and resources to capacity building and operational demands. A Trou-du-Nord specific structure would need to be put in place, but without needing to alter the balance of power on the national level regarding watershed management authority the CIAT-led approach is most capable of being quickly set-up and implemented. CIAT's Planning Authority for the North and North-East (AANNE) is already focused on promoting sustainable development in the Trou-du-Nord region, so focusing on the watershed in particular is a natural extension of work already being undertaken.

An additional advantage of this institutional arrangement is that it provides the legitimacy of being composed of a broad spectrum of government representatives. DINEPA and the Ministry of Agriculture already operate on a daily basis in the watershed, and are likely to participate in integrated water management activities if they (or their colleagues) are integral to the inter-ministerial or technical committees. As opposed to the two reform alternatives described below, the CIAT approach is the most democratic (in theory if not in practice) and broadly representative of disparate interests.

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19 Committee for the Management of the Territory: Official Site (last visited Aug. 1, 2016), http://goo.gl/53xg6p.

20 Committee for the Management of the Territory: Watershed Management (site unavailable at time of access), http://goo.gl/KQezgv.

Finally, a CIAT-led approach utilizes the substantial institutional memory and existing partnerships that have been built between CIAT, its members, and the various stakeholders of the Trou-du-Nord watershed. Regardless of which institutional structure is pursued, each mechanism will need to work with and engage the local governments, ministry offices, and industrial park. A newly created institution will need to form these partnerships for the first time, while CIAT has invested substantial resources promoting development in the northern Haiti corridor, creating relationships with donors, local governments, and national ministries. The aforementioned CNIGS, for example, can be a key partner in the CIAT framework by providing the kind of geospatial expertise needed to project future scenarios in the watershed. Importantly, CIAT has already formed partnerships with the CNIGS and is most capable of hitting the ground running in the Trou-du-Nord.

3. Disadvantages

While CIAT and its Cellule Bassins Versants et Gestion des Ressources en Eau provide a ready-made institutional structure, that structure alone is not sufficient to create a robust watershed management institution. As of July 2015 the CIAT had little to no presence in the Trou-du-Nord watershed. That may not be surprising, since the watershed is not heavily populated or geographically extensive. Nonetheless, it does imply that the CIAT has not prioritized the Trou-du-Nord watershed at present, and may need external incentives to do so.

In addition, while the national CIAT framework provides a model for down-scaling to the Trou-du-Nord watershed, a more localized approach that mirrors CIAT's national-level management structure is as yet uncommon. It is not clear if CIAT will have the political capital necessary to ensure the requisite participation from national ministries that may not be interested in the Trou-du-Nord watershed. Even if ministries are interested, they may not have the human resources needed to adequately participate. The Ministry of the Environment, for example, has little to no presence in the watershed despite an apparent mandate to coordinate and monitor water resources management. The AANNE should alleviate these concerns to some extent as it is focused on the northern region of which the Trou-du-Nord watershed is a part, but CIAT will need to develop an even more localized approach considering the smaller scale of the watershed.

It will also be difficult for CIAT to balance the competing demands for water between ministries. The Ministry of Agriculture will be expected to push for water to be used for irrigation, while DINEPA will ask that water be used for sanitation, and the industrial park will demand water for manufacturing. CIAT's role to date typically consists of coordinating synergistic or concurrent actions between ministries; making allocation decisions that promote one water use over another may require political compromises that are easier to achieve in theory than in practice. While the broad representation achieved by having representatives from across the government spectrum confers political legitimacy on the institutional structure, it may also create a breeding ground for inter-ministerial conflicts. It is not clear how national ministries will compromise considering this broad dispersal of power dynamics.

Finally, as with other alternatives, this approach requires significant investments in human resources, technology, and infrastructure. Since CIAT is not active in the watershed specifically, it will need to acquire staff and equipment, or dedicate existing resources to the watershed. Volume II of this study revealed a lack of sustained engagement from national ministries concerning Trou-du-Nord stakeholders, partly due to a lack of resources. Despite having formed key relationships and a ready-to-go institutional arrangement, CIAT will need substantial investments in order to function as a leader in water resources management in the basin.

4. Precedent - Peligre Dam Inter-Ministerial Commission

A potential model for the inter-ministerial approach proposed by this alternative can be found in the Artibonite River Basin in Haiti. The Artibonite River watershed is the largest hydrographic watershed in Haiti, providing more hydroelectricity and irrigation water than any other water source.[21] The Peligre Dam was constructed to control flows of irrigation water to watershed farming communities, supporting Haiti's largest irrigation district. The Dam also provides Haiti's main source of renewable energy. The Peligre Dam is now capable of supporting one of the most populated regions in Haiti.

Despite this development potential, the Artibonite Valley remains underdeveloped, and in particular, the water resources of the watershed are improperly managed. Much of the land area has been exploited to produce crops even when there is little potential for agricultural productivity. This contributes to increased rates of soil erosion and siltation, reducing water quality and availability. In the dry seasons soil in the watershed is insufficiently capable of retaining moisture. While the Peligre Dam is managed by Electricity of Haiti (EDH), the institution focuses heavily on electricity generation and ignores other concerns such as irrigation, environmental flows, and flooding hazards. The irrigation district is managed by an agricultural authority as well, but it suffers from an acute lack of management capacity. The same is true of more localized water users associations.

[21] Water Management Program in the Artibonite Basin, Project Concept Note, Inter-American Development Bank, (last visited Aug. 1, 2016) http://goo.gl/NzAhtE.

While the reasons for mismanagement of water resources in the Artibonite watershed are multi-faceted, one of the most significant is a lack of integrated institutional leadership. In recognition of this shortcoming, an inter-ministerial commission was created to foster communication and improve cross-sectoral water resources management. The commission was led by CIAT and supported by the IADB, and brought together various stakeholders in the watershed, including the national ministries, regional management authorities, and local water users associations. CIAT created working groups to enhance dialogue and improve synergistic management activities. An Oxfam report on the institutional commission and working groups noted that communication "increased greatly" as a result of CIAT's leadership.[22] The commission is now a key player in efforts to rehabilitate the dam, improve water resources management in the watershed, and strengthen bilateral relations with the Dominican Republic.

The Peligre Commission provides a workable model for a CIAT-led Trou-du-Nord commission for several reasons. First, CIAT has proven capable of leading an inter-ministerial effort to improve water resources management. If one of the advantages of a CIAT-led approach is that the institution already exists, then the Peligre Commission reinforces that advantage by demonstrating that a more localized, basin-level institutional arrangement has proven effective as well. In addition, many of the management challenges present in the Artibonite watershed are present in the Trou-du-Nord as well. Watershed lands are over-exploited for agricultural purposes and increase flooding risks, there is likely to be increased development and population growth, water quality is low, and existing local institutions are incapable of overcoming multi-faceted challenges. If CIAT can address these problems in the Artibonite Valley, it may be able to address them in the Trou-du-Nord as well.

On the other hand, the Artibonite watershed and Peligre Dam are undeniably vital to the development of Haiti's agricultural and energy sectors. As mentioned above, the Artibonite is the largest hydrographic watershed in the country, providing significant sources of energy and agricultural commodities. The Trou-du-Nord, while significant for the industrial development potential of the Caracol Industrial Park, is not nearly on the same level of political importance. That makes the water management challenges more reasonable to overcome, but it may also make it difficult for CIAT to mobilize participation and engagement from key ministries and government agencies.

5. Legal Reforms Required

Of the three institutional reform alternatives, the CIAT-led inter-ministerial commission requires the least amount of legal reforms. In fact, depending on the nature of the commission's structure and authority, it may not require any changes to existing laws at all. CIAT's mandate is to coordinate inter-ministerial activities, and water resources management is one of its core objectives. As the CIAT is backed by the Prime Minister, it is well-positioned to receive the political support necessary to be successful. CIAT's efforts in leading the Peligre Commission also cast doubt on the idea that significant legal reforms would be required to create a Trou-du-Nord commission.

CIAT's only statutory concern may be the 2006 Environmental Management Decree, which made explicit the Ministry of the Environment's authority over national environmental policy,[61] including the right to declare eroded land to be inappropriate for agriculture, transfer powers over forest management and water resources from the Ministry of Agriculture to the Ministry of the Environment,[62] and lead the coordination effort between ministries and local governments. The Decree doesn't provide commitments toward staffing and financing the Ministry of the Environment,[65] however, and the ministry's low levels of management capacity have created a vacuum from which many water management challenges have proliferated. While the Ministry of the Environment can and should play a large role in the Trou-du-Nord commission's leadership, the Environmental Management Decree is unlikely to pose a legal impediment to CIAT leading an inter-ministerial coordination role in the watershed.

B. Creating a Trou-du-Nord Basin Organization

A second alternative mechanism to manage water resources in the Trou-du-Nord watershed is to create a new institution in the form of a river basin organization. River basin organizations are common across Latin America and the Caribbean (see below), as they embrace decentralization and cross-sectoral water management planning. River basin organizations may have a wide variety of regulatory powers and operational functions, but at their core they share a common institutional purpose of serving the needs of basin stakeholders. A Trou-du-Nord Basin Organization would be a more ambitious undertaking than a CIAT-led body, and would require more political capital and resource support to create and maintain.

1. The Structure

A Trou-du-Nord Basin Organization could take many forms, with varying degrees of involvement from existing national ministries. In the most involved sense, the river basin organization (RBO) may look similar to a CIAT-led model in which the RBO serves a coordinating and leadership role among

22 Oxfam Quebec: Development of a Binational Technical Cooperation Structure in the Artibonite Watershed, (last visited Aug. 1, 2016), http://goo.gl/XuEihM.

ministries with independent powers and regulatory authorities. This institutional reform alternative envisions a more independent RBO mechanism, in which the RBO obtains powers over planning, data collection, modeling, pollution control, and potentially, water allocation and financing. The model is more decentralized because the institution's sole purpose is to manage water resources in the Trou-du-Nord watershed.

To be sustainably managed in perpetuity, the Trou-du-Nord RBO would require financing from the central government, stakeholders and water users, and at least initially, donor organizations. These revenue streams can be complemented with the organization's own user fees. The RBO would have management authority over the Trou-du-Nord watershed, requiring some relinquishment of authority from agencies such as the Ministry of Agriculture and DINEPA, who presently carry out regulatory and management duties in the watershed.

As with the CIAT-led approach, a Trou-du-Nord RBO would not be successful without sustained engagement from stakeholders as well as national ministries. These interests can be engaged by providing certain management powers to stakeholders where appropriate. Given limited resources, it would be strategic for the RBO to delegate sanitation control activities to DINEPA, for example, or water monitoring and research to the University of Limonade. The specifics of these roles would need to be determined through an organic RBO development process that refines duties and privileges of the various stakeholders. At its core, however, the RBO remains the decisive authority on management of the watershed.

2. Advantages

In general river basin organizations have proliferated because they create a multi-sectoral management authority dedicated to a single watershed. While national ministries each have their own mandates, some of which may conflict with respect to water use, an RBO's mandate is the sustainable management of water resources. This model embraces the principle of subsidiarity, in which water resources are managed at the lowest appropriate governance level, avoiding political dynamics brewing at the national level and incorporating local knowledge and conditions.

In the Haitian context, an RBO may be advantageous because the Trou-du-Nord lacks a meaningful management authority in the first place. A Trou-du-Nord RBO may have little to no institutional friction to deal with because it would be stepping into a leadership vacuum. The institutional capacity analysis presented in Volume II of this study suggest that there are low levels of involvement from national ministries in the watershed. This approach would not attempt to force deeper levels of involvement, but would instead create an organization dedicated to the management of water resources in the basin.

A third advantage is that an RBO provides stakeholders with a single voice with which to address water issues. While a CIAT-led approach still involves a broad spectrum of agencies with separate responsibilities, an RBO approach is more stream-lined and focused on the watershed. Considering the rapid changes to the region associated with the Caracol Industrial Park, it would be desirable to create an independent body through which water issues can be addressed and transparently resolved.

3. Disadvantages

There are significant hurdles to overcome in establishing and maintaining a Trou-du-Nord RBO. First and foremost, while the watershed may see low levels of involvement from national ministries, those ministries may nonetheless value their potential regulatory authority over the basin. Creating an RBO requires marshalling the political capital and public will necessary to create the institution, finance the institution, and work with the institution to make it successful. Given the opportunity cost of doing so, ministries may not be enthusiastic about ceding powers to a new authority. Even if an RBO is created, it will be challenging to obtain meaningful support and engagement from ministries whose powers may have been displaced in the watershed.

Second, creating an organization from scratch will require financial investments and sustained capacity building. It is unlikely that the central government or the RBO itself will be able to provide the funding needed to sustain robust management operations, meaning a third-party stakeholder such as the Caracol Industrial Park or foreign donor will be leaned on heavily for support. Creating an organization from scratch also implies a more meaningful reform effort, as described below.

Finally, while basin-level management authorities have become popular in recent years and decades, they are not without their drawbacks. Basin-level institutions are often underfunded, understaffed, and lack the political connections that central government agencies enjoy. Basin organizations are often faced with jurisdictional issues, such as management authority over an aquifer that lies outside the river basin, or conflicts with local governments, water users associations, or major private sector actors who are not beholden to the basin's authority. In the Trou-du-Nord, for example, it is not clear that a Trou-du-Nord RBO would have management authority over the Massacre Aquifer. The RBO would likely face jurisdictional challenges over water resources and land use practices from national ministries and regional governments. To overcome these challenges it would need significant political backing. Without such backing, creating an RBO risks adding

yet another layer of bureaucracy and administrative boundaries.

4. Precedent – RBOs in Latin America and the Caribbean

A 2012 study by the Organisation for Economic Cooperation and Development (OECD) found that RBOs are a common feature of the Latin American and Caribbean landscape.[23] They are most common, and in general most effective, in countries with decentralized or federal governments. In Argentina, for example, the establishment of river basin committees was designed in part to facilitate development of regional governments and communities. The committees manage water quality and quantity issues, and draw their financing from both the central and local governments.[24] In Brazil, river basin committees include participation from the central government, municipalities, water users and civil society. The committees are authorized to promote dialogue, arbitrate disputes, and develop and implement water resource management plans.[25] Mexico's central water agency (Comisión Nacional del Agua - CONAGUA) has adopted a similar approach, breaking down its administrative units into thirteen river basin authorities responsible for setting regional policy, implementing water management plans, and collecting water user fees. Within the basin authorities the agency has created more localized basin councils that work with states to coordinate water management.[26]

In Argentina, Brazil, and Mexico, RBOs are relatively well-funded and legally empowered to manage critical water resources management tasks. Other countries have adopted the RBO model but have yet to develop their RBOs to full maturity. Peru has recently adopted basin-level management (with support from the World Bank and IADB), creating several river basin councils across the country. Given the nascent state of their development, RBOs are still in the process of developing financial sustainability, human resource capacity, and dispute resolution powers. Costa Rica's Law on Water Resources set up a similar institutional framework, creating RBOs for every regional hydrologic unit. And in Nicaragua, the Law on National Waters created autonomous RBOs with broad operational, technical, and legal powers.[27] These RBOs vary in terms of their mandates, legal powers, and capacities, but most share a common set of responsibilities in creating, coordinating, and/or implementing water resource management plans for their respective basins.

The Trou-du-Nord has some potential to replicate these RBO models. Haiti's 2006 Decentralization Decree called for local-level management of natural resources, so from a philosophical point of view an RBO fits with the scheme. However, while Haiti may have adopted decentralization in principle, most local governments remain far from robust. These government units lack the financial or human resource capacity to fulfill their existing mandates (see Volumes I and II of this study), so a Trou-du-Nord RBO would be unlikely to benefit from the strong federalist or decentralized foundations found in Argentina, Brazil, or Mexico that contribute to the success of their basin-level institutions. Furthermore, in many of these countries the RBO model was adopted nation-wide, with the requisite political, legal, and financial support needed to undertake such reforms. It is unclear if a Trou-du-Nord RBO could mobilize the resources necessary to be successful if it is proposed as an isolated initiative.

5. Legal Reforms Required

Many of the Latin-America and the Caribbean (LAC) countries outlined above created an RBO framework for water management through national reforms, passing laws that created the RBOs and their legal powers. Because an RBO often cuts across political boundaries and requires participation from several different ministries and sectors, no one government unit is well-positioned to quickly and easily create an RBO. This is likely the case for the Trou-du-Nord as well. Much of the watershed lies in the Northeast Department, but key stakeholders (including the University of Limonade) are located in the Northern Department. These departments lack the capacity to create an RBO on their own as well. CIAT has heavily invested in the northern corridor of Haiti, but in order to be cross-sectoral and relatively independent creation by national ministry would not be ideal.

More than likely a decree from the Haitian Parliament would be necessary to create a Trou-du-Nord RBO, especially if it is to have administrative powers to collect user fees, adjudicate disputes, and receive funding from the central government. If the RBO acts only in a coordinating capacity, a parliamentary decree may not be necessary if the relevant ministries and stakeholders agree to participate and create the RBO as a partnership initiative. However, considering the substantial investments required to create a meaningful RBO, it would be ideal if the institution were enabled to undertake more meaningful activities, such as implementing water management plans, setting policies, or controlling water withdrawals and discharges. An intermediate approach would create the RBO as a coordinating agency among stakeholders, and pursue formal institutionalization and legal powers once the framework has been established.

23 OECD Studies on Water Governance in Latin America and the Caribbean: A Multi-Sector Approach, OECD (2012).

24 *Id*. at 86.

25 *See* National Water Agency of Brazil (ANA): Homepage (last visited Aug. 1, 2016), http://goo.gl/p50TpL.

26 *See* the Comision Nacional del Agua (CONAGUA), (last visted Aug. 1, 2016), http://goo.gl/ZoJksY.

27 *See supra* note 22 at 88-89.

C. Creating a Public-Private Management Entity

The third institutional reform alternative considered in this study is the creation of a public-private partnership (PPP) institution with management authority over the watershed. PPPs are contractual arrangements in which local governments outsource water management to a private company. The company is responsible for managing water resources sustainably, upgrading infrastructure, and providing water services to local populations. Governments retain ownership over the resource and typically compensate the private company directly for services provided. PPPs are common in areas where governments lack the capacity to manage water resources themselves, or in cases where governments lack the up-front costs to upgrade infrastructure or maintain water systems. Typically PPPs in rural areas such as the Trou-du-Nord watershed are focused on water supply (as opposed to a broader mandate to manage water resources and the various demands on them), but PPPs come in a variety of arrangements. Considering the low levels of service delivery and water management in the Trou-du-Nord watershed, a PPP to manage water resources is a viable institutional alternative.

1. The Structure

PPPs in the water sector may take several forms, authorizing the private company to take on more or less responsibility given the context. In the most involved scenarios, companies are tasked with nearly all water management duties, while the local government's role is limited to oversight and compensation. In the least involved scenarios, companies provide limited support for specific water management initiatives, such as consulting on the costs of infrastructural improvements. Given the absence of any meaningfully coordinated water management in the Trou-du-Nord, as well as the absence of a single entity to work with, a PPP for the watershed would likely call for broad delegation of powers to a private company. The company might monitor changes in water supply and quality, administer permits, collect user fees, and provide water delivery services to local communities, farms, and the industrial park.

A central tenet of this model is that the private company receives enough revenue to cover its costs. The revenue is typically provided by the government forming the PPP. In many rural and/or poor communities, however, local governments lack the capacity to finance a PPP. In these cases third-party institutions such as development banks step in to close the funding gap. Given the low levels of economic development in the Trou-du-Nord watershed, it is unlikely that the communes or departments will be able to finance a PPP. The institutional structure may therefore require financing from a foreign donor, the industrial park, or some combination of the two. The third-party would receive a significant role in oversight and strategic planning. Since the Caracol Industrial Park is itself a PPP within a special economic zone, a Trou-du-Nord watershed PPP may be pursued through an expansion of existing responsibilities of the industrial park's partners.

Some PPPs adopt a participatory approach to water management, in which local communities provide input on priority uses and the PPP builds capacity in local populations to manage water resources. This approach would be preferable in the Trou-du-Nord, as there are a variety of water users whose needs are considerable, contrasted with a lack of capacity in local institutions to address these needs. The Trou-du-Nord PPP should emphasize community engagement and capacity building as a priority management strategy.

2. Advantages

The Trou-du-Nord's local institutions are not sustainably managing water resources at present, and national ministries are struggling to balance the needs of various user groups, creating an absence of water management leadership in the basin. The two institutional reform alternatives described above implicate substantial capacity building investments in order to develop expertise. A PPP, on the other hand, would be able to step into the leadership void immediately, providing technical expertise and management capacity to address existing challenges. Many companies have experience in developing countries where conditions are similar to the Trou-du-Nord watershed, and are equipped to handle complexity.

PPPs may be mutually advantageous as well because the investment risks are shared between the local communities (or in this case, the third-party financer) and the private company. Companies typically receive remuneration upon satisfaction of certain performance objectives, or over time after committing capital infusions. The company therefore shares in the risk that a local government would otherwise absorb acting on its own. Risk-sharing may provide an added benefit in the Trou-du-Nord by projecting stability and promoting investment in the region, either in the industrial park or surrounding communities.

Of course, a central advantage of PPPs is that private companies are often able to cover the up-front costs of infrastructure installations, maintenance, and upgrades. At present the only viable sources of capital infusion in the Trou-du-Nord are not well-positioned to take on the risks or obligations of installing pipelines, levees, or water treatment facilities. A PPP arrangement, on the other hand, typically includes start-up investments from the private company. While a third-party may need to significantly finance the Trou-du-Nord PPP, leveraging private sector

funding would improve the financial viability of water management in the basin.

3. Disadvantages

While there are many examples of PPPs working well in developing countries, there are documented cases in which local populations were worse off as a result of relinquishing control over their water resources. In fact, many NGOs have campaigned aggressively to limit the privatization of water service delivery in response to unsuccessful interventions from the private sector. A World Economic Forum conference dedicated to PPP in the water sector found that the most common obstacle to a successful PPP is a lack of political will or support for a public partnership with a private (and often foreign) company.[28] While there is ample political support for the public-private nature of the Caracol Industrial Park, it is unclear if a PPP for managing water resources in the Trou-du-Nord will obtain the requisite support from stakeholders. As described below, a Trou-du-Nord PPP will require legal authorizations from the central government, so the benefits of such an arrangement will need to be clearly communicated.

Second, while many private water companies are accustomed to working in under-developed watersheds, proposing a variety of service options to meet the financing capacities of local communities, it can nonetheless be difficult for communities to find a private company willing to form a partnership and absorb risks. The business case for investment may not be strong, or the government's terms for the partnership may not be acceptable. Similarly, the terms of an interested private company may not be acceptable to Trou-du-Nord stakeholders or third-party financers.

In addition, while private water companies may bring significant technical expertise to the table, a requisite of PPPs is effective oversight from government institutions. Oversight can be challenging, however, if governments lack the capacity to regularly monitor activities and interpret conditions. A participatory PPP approach advocated above may alleviate this concern, but only if the participating government representatives and stakeholders are well supported by the central government. Many of the PPP failures cited by anti-privatization advocates stem from an inability of governments to monitor conditions and step in when needed. In the Trou-du-Nord, it is not clear which agency would have oversight authority over the PPP. CIAT is likely the best positioned institution, but would need support to take on a role of this nature.

Finally, if the Trou-du-Nord PPP is subsidized by a foreign donor or other third-party, it may be difficult to establish a path towards financial sustainability and self-sufficiency. PPPs require long-term commitments to enable costly investments to make financial returns. Development banks and organizations such as the IADB and USAID have shown a long-term commitment to the Trou-du-Nord region by supporting the Caracol Industrial Park's development, but that may not translate into sustained interest in a PPP for water management. Regardless, the PPP will need to establish a path towards self-sufficiency in order to attract investors and promote development.

4. Precedent – Water-Sector PPPs in Port-au-Prince and Saint-Marc

Haiti already has two water service delivery PPPs underway. In Port-au-Prince, a consortium of investors led by Suez Lyonnaise des Eaux has provided more than $10 million USD to the Port-au-Prince regional water utility, and provides a number of technical and operational assistance measures.[29] In Saint-Marc a full-fledged PPP was created to take over water service and management. The investor contributed $5 million USD and obtained a 15-year contract to manage the water sector.[30]

These pioneering developments notwithstanding, both initiatives have faced significant challenges that call into question the viability of PPP in the Haitian water sector. In Port-au-Prince, the consortium has been successful in translating technical assistance into improved water service delivery, but the partnership has not led to transformative change that would make the regional water utility self-sustaining. In Saint-Marc the track record is more grim, as the operator is reportedly unable to charge cost recovery tariffs and unable to break even financially.[31]

These precedents convey mixed messages for the prospects of a Trou-du-Nord PPP. On the one hand, it is promising that PPPs have already been established in the water sector in Haiti. As mentioned above, water-sector PPPs often face public and political opposition. It would be challenging if the Trou-du-Nord PPP was burdened with being the first PPP in the sector, and fortunately that is not the case. The Port-au-Prince and Saint-Marc PPPs also demonstrate interest in the Haitian water sector from foreign investors. Already there have been substantial investments and risk absorption from credible private companies.

On the other hand, these precedents have shown mixed results. It is not clear if potential investors in a Trou-du-Nord would be encouraged or discouraged

[28] World Economic Forum: *Development-Driven Public-Private Partnerships in Water, Emerging Priorities from Round-table Discussions*, Financing for Development Initiative, 3 (last visited Aug. 1 2016), http://goo.gl/2NvSll.

[29] *See* Public-Private Infrastructure Advisory Facility: Caribbean Infrastructure PPP Roadmap, 37 (last visited Aug. 1, 2016), https://goo.gl/W85sK5.

[30] *Id*.

[31] *Id*. at 22.

by the experiences in Port-au-Prince and Saint-Marc. Even if those experiences had been successful, a Trou-du-Nord PPP would be significantly different in nature. Not only is the Trou-du-Nord watershed much less populated (therefore reducing potential cost recovery and economies of scale), a Trou-du-Nord PPP would be broader in scope that water supply delivery, requiring the operator to balance human, agricultural, ecological, and industrial water needs.

5. LEGAL REFORMS REQUIRED

As a civil law country, Haiti could establish a PPP for the Trou-du-Nord watershed through a specific decree or concession law. In addition, in 2012 the Ministry of Finance established a PPP unit in order to set policy, promote investment, and generally facilitate the responsible use of PPPs in Haiti. To date, however, it lacks a guiding policy, legal framework, or funding base,[32] so its purpose and role in creating a Trou-du-Nord PPP for watershed management is relatively ambiguous. In 2010, the Central Bank of Haiti, who had management authority over the state-owned telecoms company, entered into a PPP to provide upgrades to Haiti's telecommunications infrastructure. In order to do so the Bank received assistance from the International Finance Corporation to structure the bidding process, and was represented by Haiti's Council for the Modernization of State-Owned Enterprises.[33]

However, a Trou-du-Nord PPP likely would require some degree of legal or political authorizations, because unlike the Central Bank's existing jurisdiction over the telecoms company, no single entity has a consolidated authority over management of the Trou-du-Nord's water resources. While the Ministry of the Environment has jurisdiction over water management generally, the Ministry of Agriculture has jurisdiction over "irrigation waters," and DINEPA is authorized to control water service delivery facilities. Some consolidation of these authorities would likely be required in order to allow the state (most likely the Ministry of Finance's PPP unit) to negotiate a PPP.

In addition, some administrative reorganization may be necessary in order to create a government unit with oversight capacity and authority. CIAT's role as a coordinating body, as well as its heavy involvement in development of the northern corridor and the industrial park, may suggest that it is well-positioned to serve this function. If that is the case, some capacity building and technical support may be needed to supplement its existing oversight capabilities.

[32] *Id*. at 12.

[33] *See* International Finance Corporation - Public-Private Partnership Stories: Haiti Teleco, (last visited Aug. 1, 2016), http://goo.gl/dxkzbH.

CONCLUSIONS

In this study, three institutional reform alternatives have been presented to consider the costs and benefits of pursuing water governance reform in the Trou-du-Nord watershed. Common among all three alternatives is the need to consistently engage stakeholders, provide ample financial and human resources to build capacity, and provide a clear delineation of institutional roles and responsibilities.

That being said, the three alternatives offer significantly divergent approaches to water management in the Trou-du-Nord basin. A CIAT-led approach would be the quickest to initiate, harnessing existing relationships while limiting its function to inter-ministerial coordination activities. A Trou-du-Nord RBO would consolidate responsibilities into one basin-level institution, though with a broad variance in capabilities that would be determined by the political and financial support provided. Finally, a Trou-du-Nord PPP offers risk-spreading and cost-sharing, though it may be challenging to find a partner and arrangement that satisfies all stakeholders.

While there are many governance structures available to reformers – including models that were not discussed in depth in this article – it will be important to weigh the costs and benefits of each governance structure, while keeping in mind the water governance context of the region. Regardless of the reform alternative or institutional arrangement pursued, many challenges face stakeholders in the Trou-du-Nord watershed. How these challenges are addressed will be heavily influenced by the institution that is formed to address them.

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