

Research Paper

Protecting sources of urban water supply in Haiti: An institutional analysis

Antonio Andres Martinez

ABSTRACT

Water source protection is essential to ensure the provision of safe drinking water. In Haiti, and elsewhere, this is a dynamic requirement affected by population growth, not least in urban areas. In this paper, the principles of legitimacy, integration, inclusiveness, and capacity have been used to gauge and understand the institutional environment regarding water source protection for urban drinking water provision. The research was based on a review of official documents and key informant interviews. The absence of robust legislation can result in a misinterpretation of institutional responsibilities with respect to both water and land management. The legitimacy of some key institutions is questioned due to unclear legal status, particularly when they are directly appointed by central government. Some institutions have gained recognised authority as a result of their sectoral prominence but lack legal backing. Particular initiatives may foster the integration of stakeholders but, without involving all necessary sectors, agencies and levels of government, their sustainability is questionable. Technical, structural and financial institutional capacities appear limited, hampering the implementation of initiatives and their continuity, also compounded by institutional dependence on external funds and high turnover of administrators.

Key words | Haiti, institutional, integration, urban, water resource management, water resource protection

Antonio Andres Martinez
Water and Sanitation Consultant,
C/Pedro II el Catolico 31, 4 F, 50010, Zaragoza,
Spain
E-mail: sahara.sia2@gmail.com

INTRODUCTION

The 'source to mouth' approach of the World Health Organization (WHO) Water Safety Planning framework (WSP) places a focus on the protection of water bodies against pollution to ensure safe drinking water provision (Bartram *et al.* 2009). Water resources have been under increasing pressure due to population growth, in particular rapid urban growth and the consequent misalignment of population distribution and resource allocation (Bahri 2012).

To adequately manage competing interests between water and land use requires an integrated approach promoting the inclusion of the multiple stakeholders

involved in water, land management, agriculture, health and environment (IWA 2004). Such coordination demands a solid institutional environment and clear legislation. Furthermore, the dynamic complexity inherent in ensuring safe drinking water provision to urban areas necessitates strong and sustainable (technical, structural and financial) capacities within the institutions involved (Lockwood *et al.* 2010).

These complexities are particularly challenging in countries with low development and high levels of poverty. In Haiti, this situation results in a lack of many services. For

instance, it is estimated that only 64% of the population has access to basic or advanced water supplies and a mere 30% has access to basic sanitation (UNICEF & WHO 2017).

Additionally, the patterns of population growth, deforestation and soil erosion have all contributed to diminished water accessibility (CNSA 2015). According to the Water Poverty Index, Haiti ranks lowest in the world for indicators of water resources, access and water-related environmental quality (Lawrence & Meigh 2003).

The population of Haiti is estimated to be around 11 million. In the last 25 years the urban population has tripled from 2 to 6 million. It is expected that the trend will continue in the coming decades (United Nations 2014). This urban growth is in many cases chaotic and overwhelms urban planning, resulting in high rates of illegal settlements and frequent occupation of areas that are unsuitable. This situation results in challenges to service delivery but also places pressure on water resources, particularly where critical natural resources are located on the peripheries of cities (Interview.02, 13; Noel 2012).

The Haitian institutional context exacerbates this situation. Without consistent legislation, the roles and responsibilities of institutions involved in water resource protection are not clear. Responsible institutions appear to have insufficient technical, structural and financial capacities, a high dependency on non-sustainable external support (Emmanuel 2007) and an inability to maintain water source protection initiatives (Interview.02, 03, 12).

These challenges could plausibly be mitigated through increased collaboration and coordination. Some ongoing initiatives including the National Sanitation Agreement, the Water Quality Legal Framework and the Cap Haitian Urban Plan have the potential to stimulate integration, but broad and effective coordination remains lacking.

Initial conversations with sector experts revealed that understanding the institutional environment was not straightforward. There is limited literature which deals with the subject. In 2015, Ryan Stoa analysed the institutional context regarding general water resource management, citing insufficient clarity of the water legal framework and the lack of institutional capacities (Stoa 2015). His research updated and complemented prior work by Emmanuel & Dubus (1998) which called for restructuring of the ineffective water sector and proposed the creation of

an organisation exclusively dedicated to water management. Both those studies focused on water management in general terms, without detailing the specificities of water for domestic uses or the particularities of urban land management. Similarly, Bush & Sildor (2009) published a related study which claimed that there is a need for a clear policy regarding watershed management.

The overall purpose of this research is to advance the understanding of the institutional context of water resource protection from pollution for urban drinking water provision in Haiti and to explore the challenges encountered with a view to effectively and sustainably protecting this vital resource. More specifically, this research focuses on water governance in urban areas and does not address the particularities of rural areas, private suppliers and other uses of water, such as agriculture.

METHODS

The study used an institutional analysis to describe general approaches to water source protection using a conceptual framework adapted from general literature. In parallel, two case studies of cities were undertaken to identify elements specific at the local level. The two case studies were in Port de Paix and Cap Haitian. Port de Paix was selected because its water services have long been considered the best in the country (Interview.02) and because the city's water sources are located in other jurisdictions entailing inter-communal agreements for water allocation and conservation. Cap Haitian was selected because its water sources are located in peri-urban areas with recognised risks of pollution. The two cities appear to have divergent technical capacities, dissimilar progress in developing integrated communal plans and different realities concerning the management of water sources (IBI-DAA 2013).

Three categories of information have been used for this research: general literature about the subject, specific literature from Haiti and a total of 17 in-country semi-structured interviews with key actors conducted in June and July 2016 and February 2017. The panel of interviewees comprised managers and members of different ministries at national and departmental levels, local authorities, non-governmental organisations (NGOs) and international agencies.

For the sake of confidentiality, interviewees are not named. All interview transcripts have been securely retained.

For this research, an abridged version of the conceptual framework proposed by Lockwood *et al.* (2010) is utilised. This framework was chosen due to the attention it gives to the institutional component of natural resource management (NRM) and the organisational clarity it offers. Specifically, it provides eight principles against which the institutions involved in NRM can be evaluated. Following these principles, institutions should observe legitimacy, transparency, accountability, inclusiveness, fairness, integration, capability and adaptability. Here, the four most appropriate principles for this particular context have been explored: legitimacy, inclusiveness, integration and capability. These four principles were selected because they allow for an institutional assessment to be carried out while respecting time and funding constraints.

In addition, the Bonn Charter has provided a useful understanding of the different requirements needed to ensure the provision of safe drinking water (IWA 2004). In this regard, the Bonn Charter states the need for clear legislation concerning water quality, together with strong institutional structures to ensure the implementation of the requisite tools.

To analyse institutional structures, relations between parallel departments of different institutions (horizontal interactions) as well as relations between different levels of the same organisation (vertical interactions) have been examined. Horizontal interactions regarding water resources management (WRM) are evaluated considering the relationships between the following five sectors: water provision, environment, land management, health and agriculture. Vertical interactions between central ministries, decentralised departmental offices and local authorities are evaluated and their linkages are explored along with their different responsibilities and capacities. The institutions encompassed in this research, including their responsibilities, are summarised in Table 1.

RESULTS

The information acquired through studying government documents and conducting interviews with actors employed

by various government bodies (both centrally and in the two case-study cities) is analysed in this section. The findings are delineated according to the four framework principles.

Legitimacy

Legitimacy refers to the validity of an institution to govern. This may be conferred by democratically legislated directive or earned by virtue of leadership or acceptance generated by stakeholders. Legitimacy also refers to the effectiveness of devolved authority and to the integrity with which power is executed (Lockwood *et al.* 2010).

Historically, the management of water resources in Haiti was allocated to the Ministry of Agriculture, Natural Resources and Rural Development (MARNDR), which assigned this responsibility to their National Water Resources Service department (SNRE) (Interview.06; Emmanuel & Lindskog 2000). The Ministry is in charge of 'defining the policies of the economic sector of the Haitian government in the domains of agriculture, livestock, renewable natural resources and rural development' (MARNDR 2017).

In 2006, the Ministry of Environment (MDE), following the publication of the Environmental Management Decree, acquired the responsibility for most aspects of WRM, including the reduction of resource pollution and the assurance of water availability for domestic and other uses (Haitian Government 2005). Accordingly, the SNRE was relocated to this Ministry. However, during the interviews a certain ambiguity emerged as to the role of the MDE, a circumstance also noted by other authors (Bush & Sildor 2009; Stoa 2015).

Some of this uncertainty concerning MDE responsibilities may emanate from the Environmental Management Decree itself, since it is merely a legislative proposal and not a law. Consequently, the Ministry acquired the responsibility, but not the required authority, to implement the attributed tasks (Interview.06). The Decree specifies roles and responsibilities concerning water source management, providing clear functions to the MDE. However, it does not clarify, for instance, which national institutions the local authorities should work with regarding water source management. Neither does the decree clarify how the MDE will be financed, nor how the Ministry will participate in the expected decentralisation through the provision of support to devolved authorities.

Table 1 | Institutions included in the analysis

Institution	Acronym	Year of creation	Related responsibilities/Hierarchy
Interdepartmental Planning Committee	CIAT	2009	<ul style="list-style-type: none"> • Harmonisation and coordination of governmental actions and supporting of ministries on land and basin management (MARNDR, MTPTC, MDE, MICT, MPCE and MEF) • Under the Prime Minister's authority
Local authorities	CT	–	<ul style="list-style-type: none"> • Local management of land and water resources • Regional, county and local authorities
Ministry of Agriculture, Natural Resources and Rural Development	MARNDR	1957	<ul style="list-style-type: none"> • Definition of policies in the domains of agriculture, livestock, renewable natural resources and rural development • Former supervision of the SNRE
Ministry of Commerce	MC	1958	<ul style="list-style-type: none"> • Implementation of strategies concerning commerce and industry
Ministry of Economy and Finances	MEF	1987	<ul style="list-style-type: none"> • Implementation of economic and financial strategies • Administration of the national budget
Ministry of Environment	MDE	1995	<ul style="list-style-type: none"> • Regulation of the environment sector, including most aspects of WRM • Supervision of the SNRE
Ministry of Interior and Local Authorities	MICT	1990	<ul style="list-style-type: none"> • Supervision of local authorities
Ministry of Planning and External Cooperation	MPCE	1989	<ul style="list-style-type: none"> • Implementation of economic and social development plans and coordination of the land management sector
Ministry of Public Health	MSPP	1945	<ul style="list-style-type: none"> • Management of the health sector • Regulation and monitoring of water quality
Ministry of Public Works, Transport and Communication	MTPTC	1889	<ul style="list-style-type: none"> • Management of public works, transport, energy, communications, potable water and sanitation • Establishment of planning regulations and technical standards • Supervision of DINEPA
National Potable Water and Sanitation Directorate	DINEPA	2009	<ul style="list-style-type: none"> • Regulation of domestic water and sanitation • Under MTPTC authority
National Water Resources Service	SNRE	1989	<ul style="list-style-type: none"> • Management of water resources • Under MDE authority

In addition, due to their agriculture mandate, MARNDR maintains authority over irrigation systems (MARNDR 2011). Furthermore, MARNDR's internal policies prioritise watershed management. The Environmental Management Decree that created the MDE initiated a competing dynamic between these two institutions. In fact, because of MARNDR's position as the major water user, their historical authority over water resources and their technical and financial capacities, many of the interviewees and some authors regard it as a key actor which still exerts some jurisdiction in the sector (Emmanuel 2007; Stoa 2015).

The regulation of drinking water and sanitation is the responsibility of the National Water and Sanitation

Directorate (DINEPA), an institution created in 2009 under the authority of the Ministry of Public Works (MTPTC). DINEPA is in charge of establishing and ensuring water quality standards and, in collaboration with the MDE, guaranteeing the integrated management of water resources. Paradoxically, this last point may have contributed to ambiguity in its role, since it confers responsibility for the protection of areas outside catchment perimeters to DINEPA, whereas that is the duty, by law, of local authorities, MDE and the Ministry of Planning and External Cooperation (MPCE) since they are the institutions accountable for water and land management. Despite this, DINEPA assumes, to some extent, these responsibilities, as

in the case of MARNDR, due to other institutions' failure to complete their mandate.

Ambiguity in the definition of roles is even perceptible on the MARNDR, MDE and Interdepartmental Planning Committee's (CIAT) websites, each describing similar responsibilities in basin and natural resources management (CIAT 2017; MARNDR 2017; MDE 2017). This misconception of the roles has been detected not only horizontally, but also vertically, as perceived in interviews with communal MDE and MARNDR representatives (Interview.05, 07).

Since 2006, the Haitian government has promoted institutional decentralisation, delegating certain powers to local governments. The Decentralisation Decree conferred final administrative responsibility over water resources to local authorities (CT) (Haitian Government 1984, 2013). However, although this was understood by most of the participants, it was observed that local authorities have not undertaken their roles, primarily due to their lack of capacities, and as a result, MDE, DINEPA and MARNDR are largely considered the institutions in charge.

Urban planning presents similar ambiguity with respect to institutional roles and responsibilities. Overlapping responsibilities were observed between the MPCE and MTPTC (particularly in urban administrative and technical documents) and between the MPCE and CIAT (concerning land management) (Karrour & Tribouillard 2014). The MPCE is responsible for coordinating the land management sector by supporting the establishment of Communal Development and Spatial Plans and providing guidance for land management and urban and country planning. For their part, the MTPTC holds key responsibilities in urban planning and urban engineering. Within the scope of their responsibilities are the publication of construction and land planning norms and the development and monitoring of urban plans.

Here again, as in the case of water resource management, and as stated in the Decentralisation Decree, the ultimate responsibility regarding urban planning is allocated to local authorities. They are theoretically supported by the centralised Local Authorities Directorate (DCT) which reports to the Ministry of Interior and Local Authorities (MICT) (Interview.11; Haitian Government 2013). The MICT is in charge of supervising local authorities regarding their executive authority. As such, the Ministry is

responsible for providing administrative guidance to local authorities who coordinate and control counties, districts and communes.

The CIAT may also contribute to the evidenced overlapping roles in the sector. The CIAT, as stated in its Act of creation, is in charge of harmonising and coordinating governmental actions, including revising legal frameworks and supporting the different ministries involved in land and basin management (Haitian Government 2009). The agency aims to coordinate the following ministries: MARNDR, MTPTC, MDE, the MICT, MPCE and the Ministry of Economy and Finance (MEF). Further contributing to the ambiguity of roles, CIAT is also in charge of supporting the creation of adapted urban planning tools and the creation of master plans for major urban centres, as established in their mandate and confirmed during an interview by one of their officials (Interview.11; Haitian Government 2009).

Similar challenges regarding roles and responsibilities have been observed in water quality management. The Ministry of Health, DINEPA and Ministry of Commerce (MC), supported by WHO, worked on the elaboration of the necessary water quality framework. This document, which awaits parliamentary approval, aims to establish, among other things, all responsibilities regarding drinking water quality at the national level.

This future law proposes that the definitive responsibility for water quality supervision will fall under the auspices of the Ministry of Public Health (MSPP), while water suppliers, public and private, will be responsible for achieving and maintaining the established standards (MSPP *et al.* 2016). However, the proposed water quality regulation may also contribute to the existing misconception of roles. For instance, it attributes responsibilities for basin protection to public and private users of water without considering the authority of MDE or DINEPA. Also, according to the proposed law, the area surrounding water sources will be declared as a public domain, establishing a reserved protection perimeter, without taking into account the MPCE, MTPTC or local authorities' mandate in land planning.

Regardless of legal recognition issues, institutions also gain legitimacy through sound leadership, by generating consensus around a vision and by producing effective outcomes (Newman *et al.* 2004, cited in Lockwood *et al.*

2010). Limited resources and the presence of MDE create limitations in their initiatives, constrain outcomes and reduce recognition within the sector (Interview.05). This is in contrast to DINEPA, which has acquired an unintended prominence among stakeholders due to advances in recent years with respect to access to funding, a devolved structure (Chebaane & Maurissen 2014) and leadership in inter-ministerial coordination, for example through chairing of the National Sanitation committee (MTPTC *et al.* 2016). MARNDR has also gained recognition through its historical presence in the sector and through its technical, financial and structural capacities.

Institutional legitimacy is dependent in part on acceptance and recognition by other connected institutions (Karroum & Tribouillard 2014). This can be significantly undermined when key local officials are appointed in non-transparent ways and particularly when this is led by central government (Interview.12). The frequent turnover of local representatives and the absence of a clear legal framework may also undermine that legitimacy.

Legitimacy is also impacted by structures which devolve authority. Often effective devolution to the 'lowest' level is deemed desirable, but notwithstanding this, coordinated devolution would clearly enhance the opportunities for close collaboration between key actors. The different ministries involved are divergent in terms of the extent to which their structures are decentralised and the extent of their capacities at departmental and communal levels. For example, at the time of this research, MDE had no representatives at the communal level, whereas MARNDR is represented in some communes by Communal Agriculture Offices (BAC). DINEPA, for its part, is represented at both departmental and communal levels. Consequently, the horizontal coordination of local initiatives and connections to central strategies is often disrupted.

As noted, local authorities are the ones ultimately responsible for water and land management at the local level. A similar disruption in their connection to central management has been observed. For instance, their relation with the centralised Local Authorities Directorate is perceived as insufficient, if not non-existent (Interview.12, 08).

In short, legitimacy, officially conferred by legislative provision, often competes with assumed legitimacy which has evolved and become manifest through adaptation to

the ambiguity of roles or by the access to different technical and financial capacities. As a result, different sectors and different organisational levels within institutions may be exercising responsibilities which differ from those which have been legally conferred, such as assuming others' duties (e.g., DINEPA working on sanitation coordination, including water sources protection) or adopting their own internal priorities (e.g., the Ministry of Agriculture's watershed management policy) or they may be avoiding accountability for their legislatively assigned responsibilities (e.g., MDE or CT).

Inclusiveness and integration

Inclusiveness refers to the opportunities available to stakeholders to contribute and influence decisions and actions. Integration can denote vertical interactions within institutions, or the horizontal interactions between them, which facilitate the alignment of priorities, plans and activities (Lockwood *et al.* 2010).

Solutions to WRM issues, which often require significant changes in practices, demand the participation of as many of the concerned stakeholders as possible. Previous research suggests that it is not possible for one actor alone to provide complete solutions to transversal issues such as WRM (Dovers 2005, cited in Lockwood *et al.* 2010). The recognition of linkages and interdependencies among WRM actors, and to a greater extent when urban planning is included, leads to collaboration among intervening parties. Integrated governance connects institutions by a common goal, and accordingly, it aligns priorities, plans and activities across levels and organisations (Roberts 2000, cited in Lockwood *et al.* 2010).

As stated by some of the interviewees and identified in the literature, integrated governance in water management, environment and land planning has not been exercised sufficiently in Haiti (Interview.06, 12; Stoa 2015). Nevertheless, some recent initiatives are helping to converge towards institutional coordination. For instance, by virtue of DINEPA's leadership, the 2015 National Sanitation agreement signed between MSPP, MDE and MTPTC, which encompasses water source protection, represents progress in institutional integration. However, the effectiveness and sustainability of the initiative may be compromised due to the absence

of other institutions, such as MPCE, MARNDR, CIAT and MICT.

Horizontal integration could be reinforced by the participation of MPCE, which is responsible for land and urban planning (Karroum & Tribouillard 2014), as well as MARNDR, which shares responsibilities with MDE for the SNRE (Interview.07). Since integration should be encouraged across different levels of authority, contributions from MICT may also be necessary. Equally, CIAT could facilitate and even chair the initiative, due to their mandate for the coordination and harmonisation of land and basin management, responsibilities presently assumed, to some extent, by DINEPA.

In the development of the water quality legal framework, MSPP, DINEPA and MC worked closely together. This can also be seen as a progression in institutional integration, but here again, because the MDE (water resource pollution reduction), MPCE and MTPTC (land management) and the private sector (drinking water provision) were not included, the effectiveness and sustainability of the initiative has been compromised.

Regarding coordination at lower levels, the existence of an inter-sectoral departmental roundtable permits the integration of initiatives, enhancing synergies between different domains. Within sectors, there is also a roundtable at departmental levels which group all sectoral actors. Nevertheless, the existence, regularity and effectiveness of these forums was observed to vary depending on the leadership and commitment of the different stakeholders (Interview.04, 10).

At the local level, where authorities are distant from central inter-ministerial committees (Interview.12), the development of specific and common objectives (Liu 2018), such as those enshrined in urban plans, could be used as a tool to integrate the actions of different sectors (Bahri 2012). In Haiti, the elaboration of urban and developmental plans is specified by law (Karroum & Tribouillard 2014), but not always implemented in many parts of the country. Nevertheless, Cap Haitian has developed an Urban Plan, which includes the management of water services and water sources, exemplifying how different actors and sectors can contribute to the development of a collective strategy (IBI-DAA 2013). Still, the lack of awareness-raising surrounding the Urban Plan document, along with high personnel

turnover, has resulted in that document being unknown to some departmental representatives (DINEPA, MDE). Consequently, the effectiveness of the Urban Plan could be questioned.

Information sharing may also determine institutional integration. For instance, some of the institutions involved in water management were not aware of the agreement signed between MSPP, MTPTC and MDE regarding sanitation and water source protection (Interview.04, 08, 11) and did not have the opportunity to contribute to the initiative.

Additionally, in cases where coordination is implemented through a bilateral approach, the involvement of a mediator should also be considered, as they would contribute to the resolution of disputes (Holden 2014). For instance, the Port de Paix-Chansolme agreement, for which the Port de Paix commune benefits from Chansolme commune water sources, presented difficulties regarding accountability of the Council, resulting in the non-fulfilment of the agreement. In this case, the participation of a mediator such as the MICT might have helped to resolve the conflict.

Capability

Capability refers to the strategies, abilities, leadership, knowledge, experience and resources that qualify organisations to meet their responsibilities effectively. Different institutions have different capacities which may be influenced by the maturity of the institution, the functionality of management systems and funding availability (Lockwood *et al.* 2010).

Limited availability of financial resources has been identified as one of the main challenges encountered in the implementation of Haiti's water resource management policies. For instance, the MDE's lack of sector presence may conceivably be due to its lack of financial capacities since the Decree did not clarify how the Ministry would be financed to meet the responsibilities therein (Stoa 2015). On the other hand, two interviewees suggested that it might be a result of the recentness of its inception, especially when compared to the historical presence of MARNDR (Interview.04, 06).

In devolved systems there is a risk that responsibilities are delegated to lower levels which do not possess adequate

capacities (Lawrence 2005, cited in Lockwood *et al.* 2010). The case studies explored in this research, and the existing literature more broadly, reveal that local authorities have minimal resources to execute the responsibilities assigned by national decentralisation policies, representing an important obstacle for the development of local initiatives (Karroum & Tribouillard 2014; Stoa 2015).

This lack of resources impedes the placing of ministry representatives at lower levels of government and may limit their effectiveness once there. For example, at the time of this work, the MDE was represented by a single person in each of the North and Northwest Departments while there were no specialists in environment and natural resources protection among the local authorities' staff in either Port de Paix or Cap Haitian (Interview.10).

This problem has also been detected in the realm of spatial and urban planning (Karroum & Tribouillard 2014). For instance, in Port de Paix, although national policies require the elaboration of Urban and Developmental Plans, local representatives ascribed their absence to the lack of financial capacities needed to deploy the necessary human resources. As in the case of environment and natural resources management, central government institutions should ensure that, in devolved structures, responsibilities are assigned in line with available means (Stoa 2015).

Long-term institutional viability is also compromised by financial dependence on external funds. For instance, DINEPA, with only a US\$1M annual budget assigned by central government in 2014, receives a multiyear grant surpassing US\$150M from external donors (Chebaane & Maurissen 2014). Organisations providing external assistance often impose their own objectives and short-term time frames, making it difficult for Haitian institutions to focus on their own long-term strategies which are critical to ensure sustainable water resource protection (Lockwood *et al.* 2010).

Lack of financial resources can also determine the extent to which responsibilities are assumed by institutions (Lockwood *et al.* 2010). For instance, MSPP is withholding presentation of the Water Quality legal framework to the National Congress for approval until the funds for their own participation in its implementation are secured (Interview.14). Other ministries may deliberately elude certain duties which are persistently rendered difficult by the continual lack of

resources, justifying their circumvention by referring to the ambiguity of the relevant laws (Interview.06).

Knowledge management represents a key aspect of technical capacity in complex sectors such as WRM (Lockwood *et al.* 2010), which is equally true in the case of Haiti. Stakeholders' lack of awareness of the Cap Haitian Urban Plan and difficulties accessing the Port de Paix-Chansolme Agreement illustrate how institutions suffer from limited technical capacities in information management. Interviewees blamed frequent staff turnover for this loss of information (Interview.02, 12), but that loss could have been allayed by better information management processes.

CONCLUSION

The protection of water sources is crucial in urban areas in order to provide safe drinking water services. Increasing urban populations have put water sources used for urban drinking water provision under pressure. Interactions between water and land uses are critical and entail an integrated approach characterised by close coordination between all salient stakeholders. Such coordination demands a consistent institutional context, with clear and robust legislation. In addition, the complexity of the subject calls for solid technical, legal, managerial and financial capacities from the participating institutions to ensure the implementation of sustainable long-term strategies.

In the case of Haiti, a country suffering from low development, water services have proven to be insufficient. In recent years, although investments in the sector have increased significantly, the sustainability of these services remains fragile and uncertain. Water sources are not being adequately protected and this problem is exacerbated by the rate and nature of urban expansion in the country.

In terms of the institutional context, the sector suffers from the absence of an effective and clear legislation which would define the roles and responsibilities of different stakeholders. Stoa's (2015) sectoral analysis concluded that the water law framework is highly fragmented and does not realistically take into consideration the capacities of local government entities. This study shows that insufficient capacities, together with the inherent ambiguity of the relevant laws, as in the case of the MDE regarding their

responsibilities towards water source protection, and the direct appointment of local authorities' staff, had important repercussions concerning the legitimacy of such institutions. Conversely, it has been observed that some actors, such as the Ministry of Agriculture and the National Water and Sanitation Directorate, have gained non-legally recognised accreditation due to their capacities and leadership in the sector.

A lack of clarity of roles has also been identified in the domain of urban planning, which is also subject to overlapping responsibilities between the MTPTC and the Ministry of Planning, with only a feeble presence of local authorities. Similarly, the absence of a legal framework regarding water quality sustains the ambiguity in institutional responsibilities concerning the control of safe drinking water services and the protection of water sources. Institutional responsibilities within governmental organisations are impaired by the absence of a sound legal framework and the lack of awareness of significant information by key actors.

Integrated governance of water source management has not been exercised sufficiently in Haiti. Although there are some particular initiatives that have the potential to foster this needed integration, such as the National Sanitation agreement and the development of the Water Quality legal framework, the non-inclusion of some key stakeholders may compromise their success. Furthermore, and in concordance with the observed difficulties defining institutional responsibilities, these initiatives might overlap with the mandate of other institutions, such as in the case of the Interdepartmental Planning Committee which could have facilitated the National Sanitation initiative.

Institutional coordination should involve both horizontal and vertical connections. Decentralisation policies in Haiti confer final responsibility for land and water management to local authorities. As such, the inclusion of entities that supervise and support local authorities, such as the Ministry of Planning or the Ministry of Interior, should be promoted.

In Haiti, deficient institutional capacities, which differ among sectors and vary from central institutions to devolved structures, are commonly observed. The development of strategies and initiatives should consider these differences, while simultaneously taking into account Haiti's decentralisation policies and the multi-sector nature of water resource protection, eventually adapting policies and reinforcing capacities.

Insufficient institutional financial capacities continue to have significant repercussions regarding the implementation of water governance initiatives, particularly in long-term programmes, which are hampered by the country's notorious dependence on external support. Furthermore, requisite technical capacities are also insufficient. Better information management capabilities could have, for example, mitigated the impact of information loss incurred due to the frequent turnover of authorities' personnel.

To summarise, effective water source protection is crucial to the provision of safe drinking water services, especially in areas of high urban growth and in cases where there are competing interests for land use. In Haiti, inadequate integration of salient stakeholders in the water and land management sectors, their generalised insufficient institutional capacities and the ambiguous legitimacy of the different institutions involved, all serve to impede effective and sustainable implementation of water resource protection strategies in the country.

REFERENCES

- Bahri, A. 2012 *Integrated Urban Water Management*. TEC Background Paper No. 16, Global Water Partnership Technical Committee, Stockholm, Sweden, p. 85.
- Bartram, J., Corrales, L., Davison, A., Deere, D., Drury, D., Gordon, B., Howard, G., Rinehold, A. & Stevens, M. 2009 *Water Safety Plan Manual: Step-by-Step Risk Management for Drinking-Water Suppliers*. World Health Organization and International Water Association, Geneva, Switzerland.
- Bush, M. & Sildor, E. 2009 *Watershed Management in Haiti: Recommended Revisions to National Policy*. US Agency for International Development, Washington, Dc, USA. Available at: http://www.pdf.usaid.gov/pdf_docs/Pnadpl34.pdf
- Chebaane, M. & Maurissen, S. 2014 *Water, Sanitation, and Hygiene Sector Status and Trends in Haiti*. USA. US Agency for International Development, Washington, Dc.
- CIAT 2017 CIAT website. Available at: <http://ciat.gov.ht/> (accessed July 22, 2016).
- CNSA 2015 *Haiti perspectives sur la sécurité alimentaire (Haiti Perspectives on Food Security)*. FEWS NET, CNSA, Port au Prince, Haiti.
- Dovers, S. 2005 *Environment and Sustainability Policy: Creation, Implementation, Evaluation*. Federation Press, Sydney, Australia.
- Emmanuel, E. 2007 *Faire face à la pénurie d'eau. Colloque International. Pré-actes (Facing Water Scarcity. International Conference)*. Editions du LAQUE, Port au Prince, Haiti.

- Emmanuel, E. & Dubus, J. 1998 *Bilan-Diagnostic du Secteur Eau/ Assainissement (Water and Sanitation Sector Diagnostic)*. PNUD, Port au Prince, Haiti.
- Emmanuel, E. & Lindskog, P. 2000 *Regards sur la Situation des Ressources en Eau de la République d'Haiti. (Analysis of the Water Resources in the Haitian Republic)*. Conference paper, Colloque International Gestion Intégrée de L'Eau en Haiti, Port au Prince.
- Haitian Government 1984 *Code Rural (Rural Code)*. Ministry of Justice (*Ministère de la Justice*), Port au Prince, Haiti. Available at: http://www.agriculture.gouv.ht/view/01/IMG/pdf/Code_Rural_1984.pdf.
- Haitian Government 2005 *Avant-projet de loi portant organisation et fonctionnement du Ministère de l'Environnement (Preliminary law Regarding the Organisation and Functioning of the Ministry of the Environment)*. Port au Prince, Haiti. Available at: <https://www.google.es/search?q=haiti+2005+loi+portant+organisation+et+fonctionnement+du+Minist%C3%A8re+de+l%E2%80%99Environnement.&source=lnms&tbn=isch&sa=X&ved=0ahUKEwixkMyJmZDgAhWkBWMBHaErDY04ChD8BQgPKAI&biw=1440&bih=793#imgrc=zS-1mViTsI2RqM>.
- Haitian Government 2009 *Arrêté de création du CIAT*. Port au Prince, Haiti. Available at: <http://ciat.gouv.ht/pages/arr%C3%AAAt%C3%A9-de-cr%C3%A9ation-du-ciat>.
- Haitian Government 2013 *Proposition de loi portant amendements du décret fixant le Cadre Général de la Décentralisation (Law Proposal for Amending the Decree Establishing the Decentralisation General Framework)*. Port au Prince, Haiti. Available at: http://www.leparlementhaitien.info/lesenat/images/Proposition_de_loi_decentralisation_votee_le_10_avril_2013_au_senat.pdf.
- Holden, J. 2014 *Water Resources: An Integrated Approach*. Routledge, New York, USA.
- IBI-DAA 2013 *Esquisse de Plan d'urbanisme pour la ville de Cap-Haitien (Resume of the Urban Plan for the Cap-Haitian City)*. PNUD, Government Haiti, Port au Prince, Haiti.
- IWA 2004 *The Bonn Charter for Safe Drinking Water*. International Water Association, London, UK.
- Karroum, S. & Tribouillard, C. 2014 *Rapport d'état des lieux institutionnel pour le secteur de l'aménagement (Report of the Institutional Status of the Planning Sector)*. Particip. EuropeAid, Port au Prince, Haiti.
- Lawrence, G. 2005 Promoting sustainable development: the question of governance. In: *New Directions in the Sociology of Global Development* (F. H. Buttel & P. McMichael, eds). Elsevier, Amsterdam, The Netherlands, pp. 145–174.
- Lawrence, P. & Meigh, J. 2003 *The Water Poverty Index: An International Comparison Keele Economics Research Papers*. Centre for Economic Research, Keele University, UK.
- Liu, J. 2018 *Coordination through Integration. A critical review on the spatial policy and spatial planning system of France. International Review for Spatial Planning and Sustainable Development A: Planning Strategies and Design Concepts* 6 (3), 125–140.
- Lockwood, M., Davidson, J., Curtis, A., Stratford, E. & Griffith, R. 2010 *Governance principles for natural resource management. Society & Natural Resources* 23 (10), 986–1001.
- MARNDR 2011 *Politique de développement agricole 2010–2025 (Agriculture Development Policy 2010–2025)*. Port au Prince, Haiti.
- MARNDR 2017 MARNDR website. Available at: <http://www.agriculture.gouv.ht/> (accessed July 19, 2016).
- MDE 2017 MDE website. Available at: <http://www.mde.gouv.ht/> (accessed March 3, 2016).
- MSPP, DINEPA & WHO 2016 *Projet d'arrêté établissant les règlements sur la Qualité de l'Eau Potable (Draft of the Preliminary law Establishing Regulations on Drinking Water Quality)*. Port au Prince, Haiti. Available at: https://www.dropbox.com/s/oxlbc92wgszxei/1_Projet_Reglements_Qualite%20EP.pdf?dl=0.
- MTPTC, MSPP & MDE 2016 *Protocole MTPTC-MDE-MSPP*. Port au Prince, Haiti. Available at: <https://www.dropbox.com/s/2gw39xrwa7nz94n/Protocole%20MTPTC-MDE-MSPP%20sign%C3%A9.pdf?dl=0>.
- Newman, J., Barnes, M., Sullivan, H. & Knops, A. 2004 *Public participation and collaborative governance. J. Social Policy* 33, 203–223.
- Noel, R. 2012 *Migration et gouvernance urbaine: deux thématiques fondamentales et indissociables dans le cadre de la reconstruction de Port-au-Prince (Migration and Urban Governance: two Fundamental and Inseparable Aspects for the Reconstruction of Port au Prince)*. Haiti. Available at: https://www.urd.org/IMG/pdf/Migration_et_gouvernance_urbaine_deux_thematiques_fondamentales_et_indissociables_dans_le_cadre_de_la_reconstruction_de_la_ville_de_Port-au-Prince.pdf.
- Roberts, P. 2000 Strategic connectivity. In: *The New Regionalism: Strategies and Governance* (M. Nathan, ed.). Centre for Local Economic Strategies, Manchester, UK, pp. 19–24.
- Stoa, R. 2015 *Water governance in Haiti: an assessment of laws and institutional capacities. Stoa, ryan, water governance in Haiti: an assessment of laws and institutional capacities (July 30, 2015). Tulane Environmental Law Journal* 29 (2). Florida International University Legal Studies Research Paper No. 15-27. Available at SSRN: <https://ssrn.com/abstract=2640315> and [h5p://ecollections.law.fiu.edu/faculty_publications/97](https://ecollections.law.fiu.edu/faculty_publications/97).
- UNICEF & WHO 2017 *Progress on Drinking Water, Sanitation and Hygiene*. World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), Geneva, Switzerland. Available at: <http://apps.who.int/iris/bitstream/10665/258617/1/9789241512893-eng.pdf%0Ahttp://www.wipo.int/amc/en/%0Ahttp://www.wipo.int/amc/en/>.
- United Nations 2014 *World Urbanisation Prospects: The 2014 Revision, Highlights*. United Nations, New York.