Abstract

Public sector planning, especially in developing countries, is both a theoretical and methodological challenge that is particularly important with regard to the field of environmental sanitation. This field is dominated by a technical vision that often ignores the complexity of the real world and the human dimension influenced by its actions, as opposed to a strategic one. This paper discusses the preparation of the Brazilian National Basic Sanitation Plan (Plano Nacional de Saneamento Básico – PLANSAB) with a particular focus on its future scenario construction phase, which was primarily based on Situational Strategic Planning and prospective methods. Three scenarios were developed in a participatory process that consisted of several steps and involved various social actors, including governmental officials and authorities, informed by a team of experts in charge of the whole planning process. During the process, 10 extrinsic and intrinsic factors influencing the sector were considered, which led to the generation of a set of macro directives, strategies and targets for the expansion of access to water supply, sanitation, solid waste management and urban storm water management over the next 20 years. PLANSAB was able to overcome many of the criticisms that are typically raised with regard to traditional planning, although, as with any political process, it will not be immune from inertial factors that may create obstacles during the implementation phase.

Keywords: Brazil; Public planning; Sanitation; Solid wastes; Storm water; Water supply

1. Introduction

Sectoral planning in public administration has been an imperative in developing countries and remains important in developed countries. However, several authors recognise that planning is not a neutral act and that the choice of theoretical and methodological basis for public planning relates to its effects on society and on the overall results of the public policy in question (Friedmann, 1987; Huertas, 1996). Similarly, the role of planning in building a fairer and better society remains unclear, particularly regarding the constraints of a ‘capitalist political economy and a democratic political system’ (Campbell & Fainstein, 2003).
These challenges are particularly important in the field of environmental sanitation, given that it resides within an area of knowledge and is comprised of public policies, with both of these dimensions dominated by a technical vision (Castro & Heller, 2009). This vision is opportunistic or operational, rather than strategic or visionary (Seppälä & Katko, 2009), and is vulnerable to external pressures during its transformation. Some authors attribute failures in the prevailing environmental resource management approaches to the ‘mechanistic and technocratic strategies that neglect complexity and the human dimension’ (Pahl-Wostl & Kranza, 2010). The application of this view is evident in the remarkable structural changes undergone by the environmental sanitation sector in several countries during the 1990s, with pressure for service privatisation resulting from the inductive actions and conditionalities imposed by multilateral support agencies (Hukka & Katko, 2003; Hall & Lobina, 2004; Castro, 2007).

In particular, the predominance of non-strategic approaches in environmental sanitation, mainly valuing the means in detriment to policy outcomes, can lead to interventions that have low impacts on human health, environmental improvement, appropriate urban planning and the quality of life of the population (Cairncross & Valdmanis, 2006; Heller & Castro, 2007; Heller, 2009). Although some authors argue against planning (Klosterman, 1985), this paper assumes that planning efforts in the environmental sanitation area should seek to overcome the obstacles, and ensure coherence and direction in future political decisions. The absence of a formalised plan can limit this process, such that decisions can be strongly influenced by the decision maker’s views and can be heavily oriented towards the current situation rather than the future. Decisions cannot form a coherent and strategic whole if they are isolated, disconnected, do not establish clear goals and objectives and when there are no mechanisms for monitoring and course correction in response to changing circumstances. If these conditions for coherent decision-making are not met, there may be discontinuities and fragmentation of actions, a waste of resources and inefficiency in service delivery (Heller et al., 2012).

However, within the conceptual framework that predominates in the environmental sanitation sector, there are few instances of sectoral planning and, in particular, few examples of theoretical–conceptual and methodological planning. Allowing deeper discussion about the possibilities and limitations of planning in this area would enable more appropriate applications and have concrete implications for extending the reach of services to excluded populations and improving environmental and sanitary conditions.

In Brazil, the challenge to overcome this situation is confronted by national legislation for environmental sanitation, which identifies planning as a valued cornerstone of service management. By law, municipal, regional or national plans in development must provide the following, among other issues: short-, medium- and long-term goals for the universal provision of services and achievement of improved service levels; directives and guidelines for resolving political–institutional, legal and judicial, economic–financial, administrative, cultural and technological conditions; and proposed programmes, projects and actions required to achieve goals and objectives that also identify sources of funding and procedures for the systematic evaluation of the efficiency and effectiveness of the actions (Brazil, 2007). Thus, Brazil’s relatively recent experience in this field may be emblematic and spark discussions on this topic.

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1 In this paper, we assume the term environmental sanitation to be equivalent to the concept of basic sanitation officially used in Brazil, corresponding to all of the following interventions: water supply, sanitation, urban solid waste management and management of urban storm water.
In this context, the current paper aims to describe and discuss the Brazilian experience of national planning of environmental sanitation by exploring the recent preparation process for the national plan for basic sanitation, known as Plano Nacional de Saneamento Básico (PLANSAB), with an emphasis on the construction process for future scenarios. This plan was developed between May 2010 and April 2011, and was based on work conducted by three federal public universities (Federal University of Minas Gerais, UFMG; Federal University of Rio de Janeiro, UFRJ; and Federal University of Bahia, UFBA), in conjunction with the National Secretary for Environmental Sanitation (Secretaria Nacional de Saneamento Ambiental) for the Ministry of Cities, which had previously funded the study. Due to its pioneering nature in the water and sanitation field, we think that description and discussion of the Brazilian National Plan can leverage the development and critical assessment of methodologies appropriate to this public policy, as well as to visualise possible outcomes from the exercise performed. An essential future study (not included in the scope of this paper, mainly due to the insufficient period for implementation) would be an assessment of the ability of the Plan to effectively guide Brazilian public policy in environmental sanitation.

The following section introduces the conceptual foundations for planning with a particular focus on the Latin American and Brazilian traditions in this area. In subsequent sections, the methods, results, discussion and conclusions are presented.

2. Current planning theory and its application to the environmental sanitation sector

The planning literature identifies different theoretical schools that have historically characterised efforts in this field, including the following four traditions proposed by Friedmann: social reform, social mobilisation, policy analysis and social learning (Friedmann, 1987). It is clear that choices made during the planning process can lead to different outcomes in policy implementation, and that choices can be based on different theoretical assumptions that require distinct methodological approaches.

Starting in the 1950s in Latin America, developmental ideas expressed from a Keynesian perspective, which advocated State intervention as a way of facilitating industrialisation, began to be published by the Economic Commission for Latin America and the Caribbean (ECLAC). The ECLAC began developing and disseminating planning methods and techniques to provide support for government plans in the region. In the early 1960s, the model originally drafted by the ECLAC, adapted by most of the military governments of the period, informed a Latin American planning orthodoxy aimed at overcoming the region’s problems (Medeiros, 2002).

This model, which was adopted by several Latin American countries, has been hailed as the current standard for planning and is characterised by an economistic and administrative logic that is based on the concept of efficient use of available resources, such as optimisation of the cost/benefit ratio. Moreover, this model does not consider the interrelationship between economic and political aspects, and does not allow for understanding the way in which basic structures are generated within the social system. Rather, it understands the future as a mere projection or natural progression of the past, and assumes that the State, as the plan maker, has absolute power (Matus, 1984).

In the late 1970s, this prevailing standard began to be challenged forcefully by emerging schools of thought. A strategic focus thus arose that led to a new approach to public planning that included social issues and considered the political viability of a plan to be an important variable in the planning and...
implementation process. These methods, originally developed for the health sector, were gradually incorporated into other sectors of public administration in several Latin American countries.

Carlos Matus, the founder of Situational Strategic Planning (SSP), became a harsh critic of normative planning, arguing that rather than being the privilege of a dominant social force and the circumstantial controller of the State, planning must be an accumulation of the political forces that constitute it (Rivera, 1992). In SSP theory, the actor who plans is realistic and coexists with other actors who participate in the planning. The ‘situation’ becomes the arena in which those involved are found and where their contradictory and conflicting actions are undertaken. The following four stages are considered in SSP: the explanatory stage, which is equivalent to diagnosis, in which problems are selected and their causes are discussed at the phenomenological and basic social structure level; the normative–prescriptive stage, in which the ‘should be’ design is drawn up; the strategic stage, which consists of the analysis and construction of political feasibility; and the tactical–operational stage, in which decision-making and implementation of concrete actions occur. The stages of SSP are distinct ‘steps’ as they may exist simultaneously throughout the cycle of a plan. Matus argues that the creation of a situational strategic plan must comply with the following 10 principles: who governs, plans; planning refers to the present; planning requires an assessment of the situation; planning refers to real problems and opportunities; planning is inseparable from management; situational planning is, by definition, necessarily political; planning is never about divining the future; the plan is ‘modular’; planning is not the monopoly of those who prepare it; and planning does not dominate time nor should it be stultified by time (Matus, 1984, 1989). SSP is much more than a planning method, as it can be characterised as a public instrument that provides an interface between government and society. Thus, its design and implementation is complex – a fact that has led many planners to develop methodological simplifications or adaptations.

Another trend that has recently influenced Latin America is scenario planning, which is a set of methods aimed at a long-term vision for the future, based on the visualisation of different future scenarios that guide planning (Ringland, 2006). These methods, usually known as prospective techniques, have been used to envisage risks relating to uncertainties and to provide tools to facilitate the development of strategies, with the purpose of overcoming the determinism of futurology and the mere extrapolation of trends. Thus, this school aims to develop pre- and pro-active attitudes in relation to the future (Godet, 1994). There are numerous methods for the study of scenarios, some of which can be classified as ‘flexible and intuitive’ and others as ‘formal and analytical’, according to some authors (Carvalho, 2007). The first group includes the methodology developed by the Global Business Network (GBN) and the second group includes the French school linked to the Laboratory for Investigation in Prospective Strategy and Organization (Laboratoire d’Investigation en Prospective, et Stratégie et Organisation – LIPSOR).

Of course, the development of scenarios is not a goal in itself; it is merely an element that assists in the decision-making process in the long run. The choice of the philosophy to be adopted for construction will depend upon the time available, the resources deployed and especially on the objectives of the plan, not just on the methods and instruments. It is worth noting the increase in the use of scenarios methods in Latin America, particularly involving the support of regional agencies (Vásquez & Ortegón, 2006) in several areas (Santos & Fellows Filho, 2008). Use of these methods have also been proposed in the European sphere (Kaivo-Oja et al., 2004). The creators of the methods cite operational limitations, including that it is highly recommended that the team that begins construction of a plan should not be replaced until the plan has reached its conclusion. In situations in which this process is a long one, this limitation may hinder a plan’s implementation.
There is not a wide range of regional and national experiences on environmental sanitation planning reported in the literature. A number of plans at a river basin scale have been developed and the emergence of actions in the field of environmental sanitation can be observed in these instances, such as plans to develop the Daqinghe river basin in northern China (Shin, 1999). In other cases, planning has been adopted at the State or provincial level. One of these cases was studied in the region of Algarve, Portugal (Thiel, 2010), showing that water planning can be determined by other factors significantly endogenous to the water sector, like the tourism industry, and that planning outcomes can be influenced by factors like delays in infrastructures, ideological preferences and national control over strategic water services.

Examples of plans with national coverage – both in the environmental sanitation sector and in associated sectors – also serve to illustrate what might happen. In Vietnam, national planning in the field of environmental health started from the premise that plans with a prescriptive and a top-down approach result in limited success. To overcome this, the Vietnamese adopted a ‘strong association between public policy and practice and employed a ‘learning model’ for the development of the plan’ (Powis et al., 2002).

Another inspiring case developed in Egypt during the establishment of the Centre for Futures Studies, which was created by the national government to ‘integrate future studies in the process of decision-making’ (Shakweer & Youssef, 2007). In 2005–2006, a plan was prepared for the water sector that would be valid up until the year 2025. This plan used a methodology adapted for the local environment and identified the following driving forces for scenario building: the relationships between countries in the Nile basin; water pricing; development and economic growth; water pollution; science and technology; water management; environmental change; social values; and sustainable development and energy requirements. The following three scenarios were developed regarding the future of the water sector in Egypt: prosperous era, business as usual and water for business. Egypt adopted an ‘ambitious water agenda’ (Abdel-Gawad, 2007) that demonstrated the connection between public policy and long-term planning.

The case of scenario planning for water management in Switzerland is also relevant. Researchers from the Federal Institute of Aquatic Science and Technology presented a process regarding long-term planning and scenario construction for the sustainable management of urban water in the country (Lienert et al., 2006). In this process, which was based on foresight studies, 56 driving variables were selected based on the following key question: how can the water sector in Switzerland advance in the next 25 to 30 years to ensure sustainable conditions for the next 50 to 70 years? To answer this question, a literature review and interviews with experts were utilised, and workshops were conducted to identify priorities that could lead to sustainable solutions for a period of 25 years. The following scenarios were developed: (a) **regionalisation**: optimum performance for the sector would be achieved through the fusion of various existing services to achieve economies of scale. There would be regional controls on companies that exchange experiences and know-how through unions. The centralised system would continually improve: (b) **managing material flow**: based on environmental sustainability, this scenario mainly considers the political demand for recycled materials and reduced emissions. It proposes a centralised system with decentralised technologies. Regional mergers of companies and financial measures would improve efficiency: (c) **financial crisis**: driving forces would combine deficiencies in the organisation with a strong political demand for improvement in controlling water pollution. Isolated solutions would be implemented, leading to an inefficient economic structure, with high costs for infrastructure resizing and an increasing need for the introduction of private capital.
Another important approach connecting scenario-based and participatory-based planning of water resources was developed for the Zarqa River Basin in Jordan (Shammout et al., 2013). In this study, the method adopted allowed stakeholders to identify optimisation criteria and management interventions. The outcome of the planning process aimed at increasing the supply/demand ratio and improving reliability of supply, through the identification of eight instruments: artificial groundwater recharge, inter-basin transfer, irrigation management, a public awareness programme, rehabilitation of pipes, runoff harvesting, wastewater reuse and water desalination.

The few cases reported on planning in the water sector reveal the lack of shared institutional and scientific experiences on the issue. Furthermore, these experiences, some of them using different strategies recommended by the contemporary schools of planning (such as the scenario-based method) suggest the potential of planning approaches to improve the decision-making process in the water sector and to anticipate constraints of a better future, mainly regarding the access to services of the most vulnerable populations.

3. Methods

The methodological steps necessary to build the Strategic Vision of PLANSAB were based on the assumption that simulation of the future, whilst essential in planning, is only one stage of the process which fulfils the role of ensuring the decision is made at the appropriate point and is not limited to a mere extrapolation of the past. Thus, a key element to this approach is the investigation of the influence of social, political, institutional, economic, technological and environmental variables affecting sectors that interface with the system in focus. It is assumed that involvement of different social actors with different interests and goals is essential, and that there is no single ‘reality’ for all. In summary, a dynamic, participatory and multidisciplinary approach was sought with indicative targets and programmes that were properly monitored and reviewed within pre-established periods.

Among the available methodologies, it was decided to combine the concept of Matus’ (1984) planning regarding the development of future scenarios, as summarised by Miles et al. (2002) with the experiences of other Brazilian national plans – in particular, the National Plan for Water Resources (Plano Nacional de Recursos Hídricos – PNHR) (Brasil, 2006). This approach was conceived by the universities involved and arguments for it were easily endorsed by the Ministry of the Cities, due to the tradition of public planning already existing in Brazil.

After an extensive literature review and discussions with experts, the proposed methodology was consolidated. This consolidation was achieved through the completion of five regional seminars and several meetings and workshops, which enabled the construction of a future scenario for environmental sanitation policy in Brazil for the next 20 years. The resulting decisions were based on the reference scenario. The already existent tradition of public participation in the field of urban development in the country made it easy to identify and invite key stakeholders to join the participatory process. The methodological steps were as follows:

(i) Identification of critical conditions (Workshop 1). In the scenario developing process, identification of conditions that can determine future environments is critical, as they can constrain long-term possibilities. Critical conditions, or critical uncertainties, express situations or processes of change which are relevant to the definition of future alternatives for the system.
under study, and which can be in progress, latent or potential. To identify critical conditions, a workshop was conducted with 35 social actors from various sectors of society, involved in environmental sanitation issues. Seventy-nine variables were initially examined, including social, politico-institutional, economic, technological and environmental dimensions. A matrix technique, crossing impacts and uncertainties of each variable, was used to select driving variables for the description of the future development of the sector. Finally, this set of variables was shortened to 10 variables, through a process of hierarchy of the highest levels of impact and uncertainty values.

(ii) Definition of variation hypothesis (Workshop 2). In the second workshop, the 10 critical conditions chosen in the first workshop were presented and discussed to validate them and seek possible improvements. Thirty participants from different segments of society attended and contributed towards a comprehensive description of each variable. Workshop 2 also established two or three hypotheses about the likely variation that each critical condition could face over a period of 20 years.

(iii) Construction of alternative scenarios. The combination of the 10 critical conditions with all their respective hypotheses of variation, or future states, generated an unmanageable number of scenarios. These are not all consistent given that certain combinations result in a very unlikely and contradictory vision of the future. Thus, it was initially the technical team’s responsibility to group the 10 critical conditions into five sets according to their thematic affinity and their similarity in developmental characteristics. Within the five groups of variables, 162 scenarios were generated. Next, the respective pairs of restrictions were identified through a restriction matrix, excluding combinations considered unviable or with little consistency or coherence. At this stage, the remaining number of feasible scenarios totalled 26. The next step reduced this number to 11 by analysing the similarities of some of the hypotheses. These 11 scenarios were submitted to 13 experts in environmental sanitation who evaluated the likelihood of each one. An adaptation of the Delphi method was used (mini-Delphi) with personal participation in two rounds: an individual vote followed by adjustments according to the average results across the group. After analysing which scenarios were considered most likely according to the participants’ expectations, the experts agreed on a final set of six scenarios, assuming a balance between extreme scenarios.

(iv) Generation of plausible scenarios and analysis of relevant actors. The identification of powers that might influence the course of development of a future scenario is also a critical point in this study. In order to identify the main stakeholders involved in Brazilian water sector, an electronic survey was sent to approximately 90 people around the country. From a total of 94 identified actors, an initial 19 interest groups were identified. In the third workshop, which was attended by 39 invited participants, 18 interest groups of relevant actors were validated. Then, according to a methodology of group discussions, the following matrices were developed: a matrix of power between actors, to ascertain the level of direct influence among them, and a matrix of political support for the scenarios, to assess the political support of the social actors in light of the six alternative scenarios.

(v) Definition of the reference scenario. Based on the previous steps, meetings were held with experts in public policy to openly debate the feasibility and desirability of the chosen scenarios, which resulted in valuable contributions to the final selection of scenarios and the description of hypotheses for the corresponding variables. A meeting was then held with federal government
officials to validate the plausible scenarios and to discuss the reference scenario to be adopted in the Plan. Participants validated three of the plausible scenarios, one of which was selected as the reference for PLANSAB.

(vi) **Regional seminars.** Five workshops regarding territorial diversity and thematic range were conducted in the country’s macro regions to provide State and local authorities, service providers and different sectors of society with the ability to follow and contribute to this process. These workshops aimed to contribute to the construction of directives, strategies and programmes to be integrated in the Plan by ascertaining regional visions and identifying the main problems. The seminars consisted of two days of group work and plenary discussions. The debates were focused on the necessities and challenges to be overcome and on political proposals for the region, as well as on the participants’ visions of the future with regard to the desired conditions of environmental sanitation in the region. The total number of participants involved in the five seminars was 489.

### 4. Results

#### 4.1. Definition of critical conditions

In Workshop 1, nine critical conditions of high uncertainty were selected, as follows:

(i) Stability and continuity of public policies (policies ‘of the State’, not ‘of the government’).

(ii) Investments in the sector.

(iii) Management and administration of public policy (i.e. efficiency, effectiveness, efficacy, capacity building, training of managers, planning, policy integration, unprepared managers, technical staff turnover and instrumental policy).

(iv) Role of the State.

(v) Participation and social control (i.e. awareness of society, mobilisation, organisation of the various sectors, empowerment, social control and citizens’ participation in formulation, implementation and monitoring of public policies).

(vi) Macroeconomic policy (i.e. gross domestic product (GDP) behaviour, interest rates, exchange rates, inflation and primary surplus).

(vii) Regulatory framework (i.e. legislation, standards, oversight, transparency and accountability).

(viii) Interfederal relationships (i.e. municipal services concessions to States, relation between the unions/State/municipalities and conflict resolution).

(ix) Climate change (i.e. global warming, desertification and an increase in urban and environmental disasters).

A 10th condition, the availability of water resources, was included because it was identified as having a high impact factor, although it did not have high uncertainty.

In addition to the set of conditions, the second workshop included the variable technological matrix, and considered climate change as invariant due to the known trend of worsening conditions in the coming years. The workshop also established the hypotheses of variation for each critical condition over a 20-year time frame, as shown in Table 1.
Table 1. Critical conditions and their hypotheses.

<table>
<thead>
<tr>
<th>Critical conditions</th>
<th>Hypothesis 1</th>
<th>Hypothesis 2</th>
<th>Hypothesis 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Macroeconomic policy</td>
<td>Elevated growth, consistent with debt/GDP</td>
<td>Macroeconomic policy aimed at controlling inflation</td>
<td>–</td>
</tr>
<tr>
<td>2. Administration and management of public policies</td>
<td>The State is strengthened with advances in its ability to manage policies and actions, with implementation of directives based on city statutes relating to the development of appropriate policies for large urban centres</td>
<td>The State maintains its current capacity of public policy management and corresponding actions</td>
<td>Loss of the State’s ability to manage its policies and actions</td>
</tr>
<tr>
<td>3. Stability and continuity of public policies</td>
<td>Expansion of capacity for integrated planning and creation of instruments to guide policies, programmes and projects that favour State policies with continuity between government mandates at different federal levels</td>
<td>More solid and stable State policies compared with the current situation</td>
<td>Government policies remain prevalent over State policies</td>
</tr>
<tr>
<td>4. Role of the State/development model</td>
<td>The State assumes its role as provider of public services and driver of essential public policies, guaranteeing social rights as universal with the incorporation of the environmental variable in its development model, which encourages sustainable consumption</td>
<td>Reducing the role of the State through privatisation of essential functions</td>
<td>Minimal State involvement with the transfer of essential public policies to the market</td>
</tr>
<tr>
<td>5. Regulatory framework</td>
<td>Stability, improvement and strengthening of legal and regulatory instruments with clear definitions for the actors involved, consolidation of management functions and relationships between well-established industry role players</td>
<td>Regulatory frameworks ignored and little action is applied</td>
<td>Legal instability with constant changes in legislation and regulatory rules</td>
</tr>
<tr>
<td>6. Interfederal relations</td>
<td>Strong cooperation and coordination between federal entities with improvement in interrelations</td>
<td>Cooperation of limited effectiveness and poor coordination</td>
<td>Conflicts in interfederal relationships</td>
</tr>
</tbody>
</table>

*(Continued.)*
4.2. Generation of alternative scenarios

Having established 10 critical conditions and their variations, 39,366 potential scenarios are mathematically possible, corresponding to the total number of combinations \(3^9 \times 2\) given that, for each condition, three hypotheses were conceived, with the exception of the macroeconomic policy condition, which only had two variations.

However, not all of these combinations resulted in consistent scenarios given that several of the hypotheses were incompatible with each other. Therefore, most of the variations were exclusive or inconsistent. Afterwards, in order to enable the checking of restrictions and to facilitate the study of consistent combinations, the critical conditions were initially placed into five groups of variables according to their thematic affinity and their developmental characteristics. The groups were as follows:

<table>
<thead>
<tr>
<th>Critical conditions</th>
<th>Hypothesis 1</th>
<th>Hypothesis 2</th>
<th>Hypothesis 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Investments in the sector</td>
<td>Growth in the level of federal public investments relating to GDP and federal budget resources (such as parliamentary amendments, government programmes and the Growth Acceleration Programme - GAP), which are submitted to planning and social control</td>
<td>Maintaining the current level of federal investments to GDP and federal budget resources (such as parliamentary amendments, government programmes and GAP) in accordance with the planning criteria</td>
<td>Decrease the current level of federal investments in relation to GDP and federal budget resources (such as parliamentary amendments, government programmes and GAP), with no criteria</td>
</tr>
<tr>
<td>8. Participation and social control</td>
<td>Strengthening social participation in three federal entities with a deliberative and decisive influence on the formulation and implementation of public policies, particularly in urban development</td>
<td>Maintaining the current level of participation, which is heterogeneous across different federal units and lacks decisive influence</td>
<td>Reduction of current levels of social participation with social demobilisation</td>
</tr>
<tr>
<td>9. Technological matrix</td>
<td>Technological development with the adoption of the principles of Law 11,445/2007 regarding the use of appropriate, adequate and environmentally sustainable technologies distributed throughout the country</td>
<td>Expansion of the adoption of sustainable technologies, but in a dispersed form</td>
<td>Maintaining the current technological paradigm with prevailing solutions incompatible with the demand and out of tune with international trends</td>
</tr>
<tr>
<td>10. Availability of water resources</td>
<td>Adoption of conservation strategies for water springs and clean development mechanisms</td>
<td>Maintenance of scenario with unequal access to water resources</td>
<td>Water scarcity and intensification of usage conflicts with expansion of desertification and greater occurrence of environmental disasters</td>
</tr>
</tbody>
</table>
(i) Macroeconomic policy.
(ii) Role of the State/regulatory framework/interfederal relationship.
(iii) Management and administration of public policy/stability and continuity of public policies/participation and social control.
(iv) Investments in the sector.
(v) Technological matrix/availability of water resources.

Pairs of restrictions were identified for the five variables, which reduced the number of possible scenarios to 11, as illustrated in Figure 1.

During the meeting with experts, the scenarios were evaluated to ascertain the probability of occurrence of each of the hypotheses. The conclusions showed that scenarios C4, C5 and C6 had the greatest probability of occurrence. Aiming to ensure a balance between scenarios with different tendencies, the alternatives expressed in scenarios C1, C3 and C11 were also selected. Thus, a total of six alternative scenarios were chosen during this stage.

In Workshop 3, the scenarios were studied to assess the political support of social actors in regard to the six chosen alternative scenarios. The actors’ positions were used to create the political support scenario matrix. According to workshop participants, two of the six scenarios did not have political support from the actors selected (C6 and C11). Therefore, only four were considered plausible scenarios (C1, C3, C4 and C5). Table 2 presents the matrix of political support for the six scenarios.

4.3. Final construction of the scenarios

In Workshop 4, experts and technicians from the Federal Government defined the final scenarios. The three most consistent scenarios forming qualitatively different futures were selected and scenario C1 was chosen as a reference for national policy on environmental sanitation.

During this selection, the first consideration was that the chosen scenarios should be somewhat plausible. Hence, scenarios that clearly pointed to very unfavourable situations for national environmental sanitation policy were excluded given that they did not appear consistent with a future based upon current reality. Second, it was proposed that Scenario 1 should be selected as the planning scenario. This decision was based on a consensus between Federal Government authorities and the technical team, and involved a type of rationality both technical and political. Scenario 1, possibly the most optimistic among the three scenarios, seemed to the group both feasible (due to the favourable political and economic environment in the country at the time) and desirable (in the sense that the more ambitious goals and directives stated by Scenario 1 could provide stronger support for the future implementation of the plan).

After the three reference scenarios were chosen, each was given a name to symbolically convey its defining characteristic. They were named after songs from a Brazilian songbook to create a relationship of familiarity between the scenarios and the sections of society who would be working with them in the planning environment. Thus, the chosen scenarios – 1, 2 and 3 – were designated as Paratodos (For All), Nada será como antes (Nothing will be as Before) and Apesar de você (Despite You), respectively.

The choice of the For All scenario was due to the premise that the Brazilian economy would experience reasonable growth in the period from 2011–2020, during which time the necessary structural reforms would be made and some bottlenecks would be overcome, particularly in the area of
economic infrastructure. This period would lead to greater economic growth in 2021–2030. This performance would indicate that investments in environmental sanitation in the country from 2010 to 2030 would stabilise at a high level when compared with federal funds historically invested in the sector.

The Nothing will be as Before and Despite You scenarios, in turn, presuppose an economic growth rate that is lower than that of the For All scenario, in both of the sub-periods (2011–2020 and 2021–2030), with economic policy aimed primarily at controlling inflation. Nevertheless, in both scenarios, investments in environmental sanitation would grow significantly with stability between 2010 and 2030, although at levels lower than projected for the reference scenario. The basic difference between the Nothing will be as Before and Despite You scenarios is that, in the latter, lower relative success is envisioned for urban, technological and environmental development policies.

5. Discussion and conclusions

This study investigated several dimensions of the topic in question. Initially, in relation to theoretical and methodological frameworks, the option of linking two schools of thought (SSP and scenario-based planning), one of Latin American origin and the other originating in the northern hemisphere, proved to be consistent, as it was compatible with public planning logic and was able to generate sound results. Each approach individually proved to be of limited application to the problem discussed. SSP is based on the premise that ‘who governs, plans’ and corresponds generally to the planning of a government, whether public or within civil society organisations (Huertas, 1996). Conversely, scenario-based planning has developed considerably in public corporate planning, and particularly in private corporate planning, with scenarios being built based on a participatory process involving the company heads who are responsible for implementing the plan.
Table 2. Matrix of political support for the six alternative scenarios.

<table>
<thead>
<tr>
<th>ACTOR</th>
<th>Weight(^{a})</th>
<th>SCENARIO C1</th>
<th>Support(^{b})</th>
<th>SCENARIO C3</th>
<th>Support(^{b})</th>
<th>SCENARIO C4</th>
<th>Support(^{b})</th>
<th>SCENARIO C5</th>
<th>Support(^{b})</th>
<th>SCENARIO C6</th>
<th>Support(^{b})</th>
<th>SCENARIO C11</th>
<th>Support(^{b})</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Federal government institutions responsible for policies regarding sanitation, urban development, social, health, water resources and environment</td>
<td>33</td>
<td>5</td>
<td>165</td>
<td>3</td>
<td>99</td>
<td>1</td>
<td>33</td>
<td>1</td>
<td>33</td>
<td>– 3</td>
<td>99</td>
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(Continued.)
Table 2. (Continued.)

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\[a\] The weight of each actor was based on its degree of influence over the others. In Workshop 3, the matrix of powers between actors was developed, based on the ranking: 0: actor i does not influence actor j; 1: actor i occasionally influences actor j; 2: actor i influences decisions for action of actor j; 3: actor i strongly influences actor j. The combination of the rankings established for each actor resulted in its overall weight.

\[b\] Corresponds to the result of the matrix of political support for the scenarios. Also in Workshop 3, the participants defined to what extent each actor would support each scenario, through the ranking: 5: promotion; 3: support; 0: neutral; −3: opposition; −5: veto.
The developed plan adopts many of the principles espoused by the founder of SSP and his followers. Among other principles, this school of planning believes that planning is necessarily political, is necessary to account for everyone’s views, even when they might seem misguided, extremist or ineffective, should not be restricted to an economistic view, must have its focus on the ‘problem’ (i.e. the effects of environmental sanitation policy on a population that is either not served or poorly served, and on the intersectorality required for addressing these effects) and not on the ‘sector’ (i.e. solutions to environmental sanitation problems transcend the organisation itself) and must deal in its strategic calculations with the uncertainty of the future (Matus, 1984, 1989; Giovanella, 1991; Huertas, 1996; Teixeira, 2010). Regarding the issue of overcoming the technical nature of the Plan, that is, that planning is inherently a political act, it can be stated that PLANSAB’s efforts are in line with Colebatch’s (2006) proposals regarding water use, such that ‘governing of water use should be observed, not as a technical response to an unambiguous need, but as the outcome of a continuing and complex process of institutionalisation’.

Regarding scenario-based planning, PLANSAB also incorporates a set of principles, including that ‘the future is a space open to multiple possibilities, a repository of predetermined elements, on-going change and great uncertainty’. It avoids ‘top-down thinking’ by resisting the appropriation of the vision by those actors involved in the problem, while not ‘avoiding the experts’ nor turning the act of planning into a mere populist exercise with no connection to reality (Godet, 1994, 2006). The construction of scenarios as an essential foundation of PLANSAB is a step towards overcoming the warnings of authors, such as Pahl-Wostl (2002), regarding the need to overcome the inflexibility of technological resource management regimes and their inability to adapt to changes in environmental, economic or social circumstances (such as, in the case of the water sector, uncertainties in demand, in water quality or in ‘fast changing socio-economic boundary conditions’).

The participatory character of the Plan should be emphasised. Its various steps involved people from social movements, technicians, government officials, representatives of private enterprise, service providers and community organisations, including cooperatives for solid waste recycling, among others. Participation was not just rhetorical but genuinely resulted in shaping the content of the Plan, including several of its elements, such as the diagnosis of problems, scenario building, establishment of macro-directives and defining strategies. Within this method, the involvement of different actors may have served three different purposes: it brought security to the Plan content, which allowed for the sharing of knowledge; it increased the legitimacy of the Plan by enabling various sections of society to recognise it; and it will help with regard to its application, given that these actors may exercise social control over the resulting policy. This process utilised the practice of social learning, which some authors view as a necessary component for a paradigm shift in water management (Pahl-Wostl, 2002; Pahl-Wostl et al., 2011).

Furthermore, it can be observed from the results of the scenario building that the perception of the future of environmental sanitation in Brazil incorporates conditions that are both extrinsic and intrinsic to the environmental sanitation sector. Extrinsic conditions are considered determinants of a socio-political order (i.e. macroeconomic policy, the role of the State, regulatory framework and interfederal relationships), which are related to public policies (i.e. management, stability, continuity and participation) and to the availability of natural resources (i.e. water resources). Intrinsic variables, such as investment in the sector and the predominant technological matrix, are also important. That is, the scenarios sought to ascertain what conditions would prevail in the public political environment, whether within or outside the sector and whether under its governance or not. It is an approach
that is different from, for example, the study conducted in Switzerland (Lienert et al., 2006), in which scenarios related mainly to the profile that would be assumed by the water industry: regionalisation, emphasis on material flow management and the financial crisis experienced by the water companies. In a similar manner, this approach differs from the planning developed in Egypt, in which scenarios that were more intrinsic to the sector were envisaged: prosperous era, business as usual and water for business (Shakweer & Youssef, 2007), and in Jordan, in which the efforts were concentrated in optimisation of a scenario for water resources management, emphasising technological instruments intrinsic to the water sector (Shammout et al., 2013). Of course, the plans made in the four countries have different purposes and methodological strategies, which explains the particularities regarding the results.

Friedmann (1993), in a seminal study, proposed a non-Euclidean planning method. Among other characteristics, it was a normative plan that was informed by pre-set and non-neutral innovative, political and transactive values, focused principally on populations affected by problems in a participatory manner and based on social learning. In the development of PLANSAB, some non-Euclidean patterns can be identified, although these are restricted due to the national scale of the plan. This large scale makes it difficult to create scenarios that are entirely representative of those affected by the problem and have those same scenarios be able to predict local problems in all their rich detail, due to the size of the country, its geographic and socio-economic diversity, and the complexity of the needs of the four components of environmental sanitation addressed.

Obviously, some criticisms regarding planning from a number of authors could apply to this case. There are clear limits to how much planning that is developed in isolation can break the inertia that hinders political change (Castro, 2009; Schlüter et al., 2010). Moreover, criticisms of public planning from Marxist approaches can also be envisaged in this process, in the sense that, in a capitalist society, generality in planning does not allow the understanding of ‘the dynamic process that creates both the problems to be solved and the goal to be achieved’ nor does the plan itself consider the need for a critical analysis of either the ‘desired goals’ or the ‘course of actions’ (Cenzatti, 1987).

In fact, upon analysing the course of events following the preparation of PLANSAB, different political hitches for its final approval and subsequent implementation were observed. The first version, as described in this paper, was completed in June 2010 with the aim of submitting it for public consultation and to be approved by the Presidency of the Republic later in the same year. This was not accomplished and a new schedule was established, after April 2011, for the completion of five regional workshops and two public hearings with subsequent submission of this version for public consultation and publication by December 2011. Steps were completed for the regional workshops and the public hearings, but the electronic public consultation was only launched in July 2012, with submission of additive, substitutive and suppressive amendments up to September 2012. The 448 amendments were carefully evaluated, by the Federal Universities of Minas Gerais and Rio de Janeiro and by the National Secretariat of Environmental Sanitation of the Ministry of the Cities, at the same time updating of some parts of the Plan, due to the launch of new official surveys after the completion of the previous version. In the first semester of 2013, the Plan was submitted to and approved by national councils of health, the environment, water resources and the cities, and it was finally published in December 2013.

Anyway, the approval of PLANSAB has faced unreasonable delay, postponing its implementation. There are various speculative reasons regarding the (obviously political) large period of time for the approval of the Plan, including the relatively weak position of the Ministry of Cities, an arena...
dominated by a political party that does not occupy a controlling position in government, and the reluctance of the government’s inner cabinet to commit itself to meeting the large funding needs estimated in the Plan. Furthermore, from an academic standpoint, this process highlights issues relating to the centralist tradition of recent Brazilian governments, associated with the high degree of popular approval, allowing their interests to outweigh the intense mobilisation of society, as in the case of popular support for the Plan. One question is whether these same political actions will succeed in obstructing implementation of the Plan. However, the intense popular movements that occupied the streets of several Brazilian cities in June 2013, starting with claims on prices of public transportation tariffs and evolving to a broader political agenda, has showed that the sensitivity of the government to popular demands can be revived, depending on the intensity of the mobilisation. Undoubtedly, a great expectation on the approval and, especially, the implementation of PLANSAB is shared by several social actors of the environmental sanitation sector, among other reasons due to the intense participatory process.

The process described in this paper can be a vehicle to redeem the idea of public planning in the environmental sector in Brazil, at several scales. The very low cost-efficacy of PLANSAB could be a very good argument for it: the cost for contracting the universities was around US$1,300,000, corresponding to only 0.01% of the mean annual investment in environmental sanitation interventions estimated in the Plan (US$11 billion). Furthermore, implementation of the national policy for environmental sanitation in Brazil informed by this Plan is presumed to be less centralistic, less arbitrary, less short-term oriented, less clientelistic, and fundamentally more strategic, due to the several prospective and normative views ensured by the Plan.

Acknowledgements

The authors would like to thank the National Secretariat of Environmental Sanitation (Secretaria Nacional de Saneamento Ambiental), the Ministry of Cities, Brazil, and Sonaly Cristina Rezende, Ana Lúcia Britto, Luiz Roberto Santos Moraes and Patricia Campos Borja, who shared in coordinating studies for the Brazilian National Basic Sanitation Plan with the first author of this paper. We would also like to thank the entire team of technicians, consultants and students who contributed to the performance of participatory events. We are also grateful to three anonymous reviewers for their feedback and insights, which helped to improve the paper.

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Received 29 July 2013; accepted in revised form 27 December 2013. Available online 12 February 2014