

Review Paper

Challenges for the future of urban sanitation planning: critical analysis of John Kalbermatten's influence

Ruth Kennedy-Walker, Barbara Evans, Jaime Amezaga and Charlotte Paterson

ABSTRACT

During the 1980s, John Kalbermatten and his colleagues at the World Bank revolutionised urban sanitation planning. During the last 30 years urban sanitation planning theory has evolved from an engineering focus to a more participatory, multi-disciplinary and user-focused future, informed largely by the work of John Kalbermatten. This paper looks at a number of the most important urban sanitation planning approaches that have emerged post-Kalbermatten and seeks to trace the influence of Kalbermatten's work on their theoretical underpinnings and characteristics. The extent to which other ideas, such as the sanitation value chain, have increasingly been incorporated into planning approaches is discussed and some of the challenges affecting successful urban sanitation which lie outside of planning are considered. Final comments centre on common themes occurring in practice, the future exploration of which offers potential to inform successful sanitation delivery in the future.

Key words | enabling environment, participation, planning, sanitation, urban

Ruth Kennedy-Walker (corresponding author)
Jaime Amezaga
Charlotte Paterson
School of Civil Engineering and Geosciences,
Newcastle University,
Newcastle-upon-Tyne NE1 7RU,
UK
E-mail: r.kennedy-walker@ncl.ac.uk

Barbara Evans
School of Civil Engineering,
University of Leeds,
Leeds LS2 9JT,
UK

INTRODUCTION

In the late 1970s John Kalbermatten and colleagues at the World Bank led a shift in the approach to planning and implementation of urban sanitation in less-developed countries. They were responding to the repeated failures of conventional sanitation solutions which were increasingly found to be inappropriate for the contexts in which they were being implemented. Kalbermatten was concerned that this would have disastrous consequences for the planned International Drinking Water and Sanitation Decade running throughout the 1980s. The new approach first formulated in the World Bank publication, 'A Planning and Design Manual' addressed not only inadequacies in the technology being recommended but also the planning failures that had caused so many inappropriate solutions to be selected in the first place (Kalbermatten *et al.* 1982a, b). Since then a large number of urban sanitation planning approaches have been developed, each with unique ideas and methodologies but mostly stemming from those original conceptual foundations brought to the sector by Kalbermatten. This

paper looks to provide an overview of the main urban sanitation approaches developed in the last 30 years, to identify how John Kalbermatten impacted the sector and establish if recent planning tools are achieving in practice what Kalbermatten first set out to do. It also explores how understanding those initial concepts can guide the future of urban sanitation planning.

THE NEW WORLD BANK PLANNING PARADIGM

Before turning to more recent developments it is useful to consider how urban sanitation was developing in the late 1970s and John Kalbermatten's influence upon it. For industrialised countries, conventional sewerage (waterborne sewerage) had long been the technology of choice for the disposal of human excreta (Kalbermatten *et al.* 1982b). This preference was also evident in less-developed countries, with conventional sewerage being considered by engineers and planners as the only

sanitation technology option for their cities (Mara 1996). In reality, the high cost of installation, operation and maintenance of conventional sewerage systems and the need for an in-house (on-site) water supply meant that conventional sewerage proved to be an inappropriate option for many developing country cities that lacked the regular fund flow to pay for proper operations. For these reasons, it proved wholly inappropriate in rapidly growing low-income and unplanned urban communities which were often excluded from the planning and implementation process (Mara 1996). High expectations for sewerage continued despite limited capacity, inadequate financing and weak institutions in most cities and towns. Given the high costs of the solutions being recommended, investment was concentrated on capital and major cities and often resulted in systems that were only partially usable and rapidly fell into disrepair as funds dried up. The result was decades of slow progress within the sanitation sector (Kalbermatten et al. 1982b). Proof of this remains with

us today – a recent study estimated that even among water utilities serving sub-Saharan Africa's largest cities, only 50% offer sanitation services and of those with sewer networks only 50% of their service area has sewer coverage (Morella et al. 2008).

Kalbermatten's big ideas

Kalbermatten and the World Bank proposed an alternative model of sanitation planning (Figure 1). The model re-focused the attention of the engineers who were still largely leading planning efforts. The four underlying principles were:

1. To identify sanitation interventions that would provide maximum health benefits; Kalbermatten asserted that conventional sewerage was unsuitable as its aim was to maximise convenience.
2. To consider the whole range of potential sanitation technologies, selecting those that would provide as many people as possible with the required facilities.

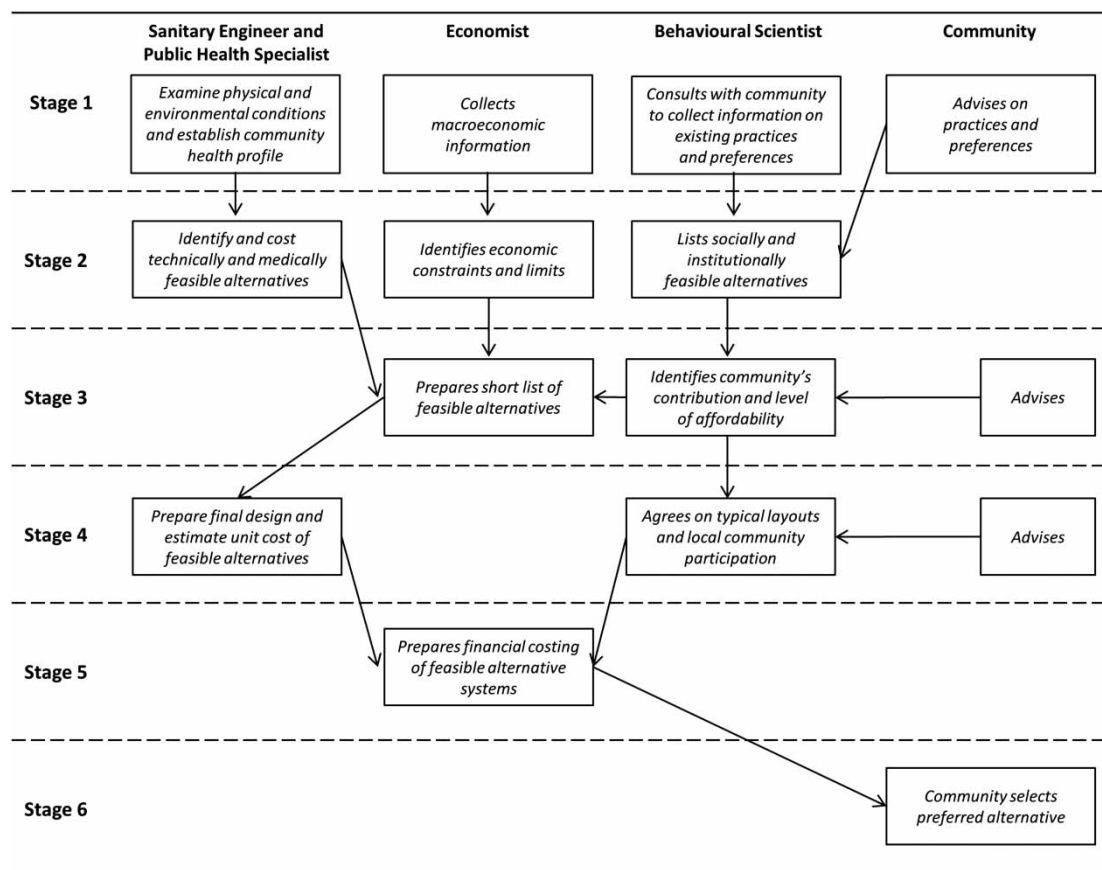


Figure 1 | The World Bank model for sanitation programme planning (Kalbermatten et al. 1982b).

3. To move away from a top-down technology-centred approach to planning and encourage the inclusion of additional professional disciplines.
4. To include the community in a more iterative planning process. The rationale of which was that an interdisciplinary project team would more successfully interact with the community to identify a wider range of technically feasible, economically and financially affordable, and socio-culturally acceptable sanitation options (Kalbermatten *et al.* 1982b; Mara 1996).

Supply and Sanitation along with numerous conferences and declarations have resulted in sanitation becoming more prominent in the global agenda for development. Consequently, over the last 30 years a number of sanitation planning models have been developed which have shaped this sector. Figure 2 presents a timeline of events, which have been instrumental in shaping the urban sanitation planning sector, and which illustrates the contemporaneous planning approaches.

Kalbermatten's influence on evolving urban planning approaches

In the following sections urban sanitation planning approaches which have been influenced by Kalbermatten's concepts will be considered. We seek to give an overview of their implementation in practice and their ability in achieving sanitation at scale based on the rationale set out by Kalbermatten.

THE EVOLUTION OF APPROACHES

The global landscape

Since the development of the World Bank model, events such as the International Decade for Drinking Water

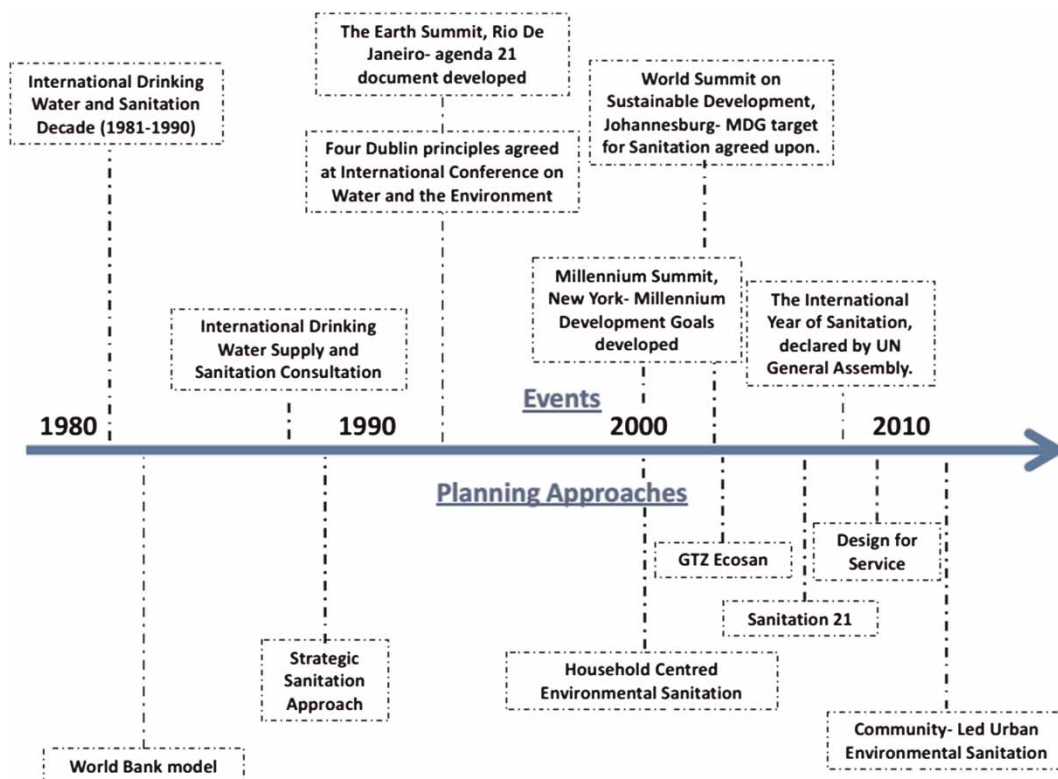


Figure 2 | Timeline of development of selected urban sanitation planning approaches and significant events in the sanitation sector.

Strategic Sanitation Approach/strategic sanitation planning (1989)

The Strategic Sanitation Approach (SSA) first described in 1989 by the UNDP-World Bank 'Water and Sanitation Program' (WSP), was strongly influenced by Kalbermatten, who was responsible for establishing WSP (Black 1998). WSP developed the approach and used it to guide significant World Bank-supported urban sanitation investment, pilot projects in Kumasi, Ghana and Ouagadougou, Burkina Faso. Since then it has formed the basis for a number of projects in India, Indonesia, Thailand, Brazil and Pakistan (Peal *et al.* 2010).

Drawing on Kalbermatten's ideas, the multi-disciplinary team codified a planning approach, which recognised that there was a pivotal point of action at the neighbourhood level. The key new idea was to respond to demand at the community level (an idea which drew strongly from recent developments in the rural water supply sector) where demand would be demonstrated both by the participation of communities in planning and management and by their willingness to pay for elements of the system. The approach also considered incentives at each level, seeking to understand what motivated communities, local government and other actors along the sanitation value chain. An outcome of that approach was the idea that sanitation services could be 'unbundled' – different solutions could be used in different parts of the city (horizontal unbundling) and different management arrangements could be used along the value chain (vertical unbundling) (Tayler *et al.* 2000; Peal *et al.* 2010). The SSA also specifically encouraged a consideration of sanitation across the entire sanitation value chain (i.e. including collection, transport and treatment of waste as well as household level services). In relation to the four underlying principles of the World Bank model, SSA reiterates the importance of household level participation, the need for an inclusion of a multi-disciplinary planning team whilst introducing the idea that different technical solutions and services can be used for different situations/environments within one city.

While SSA worked well in Kumasi and Ouagadougou where there was significant technical and financial support, it presented challenges in cities with less planning capacity (WSP 2000; Vezina 2002; Colin *et al.* 2009). Reports have

noted that for such an approach to work (as with any planning approach) an 'enabling environment' needs to be created on the ground to specifically deal with such an incentive and demand-based focus (Colin *et al.* 2009; Murray 2009; Peal *et al.* 2010).

Household centred environmental sanitation (HCES) (2000)

In 2000 the environmental sanitation working group of the Water Supply and Sanitation Collaborative Council (WSSCC) developed the so-called 'Bellagio Principles', a set of principles for good urban environmental sanitation (Eawag 2005). They state that human dignity, quality of life and environmental security should be at the centre of urban sanitation planning; decision-making should involve participation of all stakeholders; waste should be considered as a resource and should form part of an integrated water resources and waste management process; and that environmental sanitation problems should be resolved at as low a level as possible (Peal *et al.* 2010). Kalbermatten was part of the working group and was key in the conceptualisation of the Bellagio Principles; the underlying principles of the World Bank model can clearly be seen within these (Kalbermatten *et al.* 1999; WSSCC 2000).

HCES was developed to operationalise the Bellagio Principles. It was conceived by the WSSCC working group and further developed by the Swiss Federal Institute of Aquatic Science and Technology (EAWAG) and identified that for any plan to be successfully implemented an 'enabling environment' needed to be established within which the hygiene or sanitation intervention operates (Peal *et al.* 2010). To achieve an 'enabling environment' certain requisites were to be met.

- An adequate level of **government support** for the project in terms of political support and favourable national policies and strategies.
- A **legal framework**, with appropriate standards and codes at national and municipal levels.
- **Institutional arrangements** that suit and support the approach of the project.

- Effective **training and communication** ensuring that all participants understand and accept the concepts.
- **Credit and other financial arrangements** that facilitate the required level of participation and community involvement.
- **Information and knowledge management** providing access to relevant information sharing experiences, training and resource materials, the development of new approaches and the dissemination of findings (Eawag 2005).

This 'enabling environment' framework goes beyond the multi-disciplinary approach in Kalbermatten's original model and recognised that the entire institutional context influences whether appropriate planning can be achieved. This was highlighted in the experiences of WSP with SSA pilots in India. The HCES approach also formalised the value placed on the ecological effects of sanitation by the Bellagio Principles; particularly the idea of resources from sanitation being used as close to the point of production as possible and the link to integrated water resources planning – both of which were important ideas in the wider water sector of the time. This focus on ecological concepts may also have encouraged a consideration of technologies with stronger 'ecological' credentials when compared to conventional sewerage and pit latrines – although this is not particularly evident from case-study literature. Like the World Bank approach, HCES aims to respond to the users' needs and demands by ensuring they are placed at the core of the planning and implementation process (Peal *et al.* 2010).

This approach has been extensively implemented in a number of locations. Evaluative literature is limited; however, reporting from a number of pilot studies highlights that the presence of an 'enabling environment' was critical to success. In particular, capacity and access to requisite professional skills was noted as a requirement alongside local knowledge of existing sanitation solutions (particularly non-conventional ones), enabling institutional arrangements, government/authority skills and support, a suitable legal framework and access to the necessary financial arrangements (Peal *et al.* 2010; Rohrer 2010).

Sanitation 21 framework (2007)

In 2007 the International Water Association (IWA) attempted to 'take stock' of the state of knowledge around urban sanitation, especially planning, and interpret this for the use of professional engineers working in less-developed countries. The resultant framework, known as Sanitation 21, encourages technical professionals to think beyond 'business as usual' by reiterating key ideas from models such as those outlined by Kalbermatten, SSA and the HCES approach (IWA 2006). The framework defines 'domains' within which sanitation exists (from household, via neighbourhood and ward, to the wider city and beyond). These domains are defined by different social and political norms and structures and provide a framework, within which the approach can identify aspects such as stakeholder interests, stakeholder capacities, external factors and existing systems and their functionality and success (IWA 2006). These domains can then map fairly accurately onto the technical elements of the sanitation value chain (collection, transport, treatment, disposal, reuse etc.). This allows for a more realistic assessment of the feasibility of a range of sanitation solutions by considering whether management capacity to operate it exists in the places where it is needed. Solutions to local problems are thus linked to feasible systems of collection, transport and disposal/reuse of waste (IWA 2006; Murray 2009; Peal *et al.* 2010). Relating back to those four concepts defined by Kalbermatten, this approach looks to go beyond the engineer by ensuring a wide range of stakeholders (including households) are included within the process. One could argue that the focus on influencing professional engineers may make Sanitation 21 less accessible for non-technical stakeholders. Another interpretation is that IWA considered that the professional engineers were the ones who had most to gain from a deeper understanding of the non-technical, institutional aspects of effective sanitation service delivery. In terms of technology selection Sanitation 21 once again highlights the importance of understanding the entire sanitation value chain and opens the door to technologies which optimise ecological value. This approach seems to focus less on health specifically but instead on how effective and efficient the chosen

technology will be within the defined environment. There is currently no documented evidence of this approach having been tested on the ground so it is difficult to establish its success in implementation.

Community-led urban environmental sanitation (CLUES) (2011)

The implementation of the HCES approach highlighted the importance and the challenge in achieving community participation (including the household level and beyond) in the planning and decision-making processes and prompted the development of the new hybrid planning framework, CLUES (Lüthi *et al.* 2011). CLUES provides a seven-step approach to planning for environmental sanitation (water supply, sanitation, solid waste management and storm drainage), which emphasises the importance of broad community involvement as well as encouraging a multi sector and multi actor approach (Lüthi *et al.* 2011). As with the HCES approach, CLUES calls for an 'enabling environment' to be established that provides the required conditions for sustainable environmental sanitation intervention (identical to HCES approach). This approach addresses some of the pitfalls seen in the earlier HCES and identifies the importance of the processes of awareness raising and communication, capacity development throughout the planning process and also returns to the theme of SSA by highlighting the importance of monitoring and evaluation, ensuring accountability and tracking success of the intervention throughout. This approach expands upon some of Kalbermatten's original concepts, especially the importance of household-level inclusion in the planning process. It further develops the idea of the 'enabling environment' and refers to the need to include expertise from different sectors and roles. Building on Bellagio it highlights the importance of viewing waste as a resource and as integral to a sustainable solution. This is a very new approach with little evidence of its successful implementation on the ground. Notwithstanding this the Centre for Urban and Regional Excellence, in partnership with Eawag-Sandec, with the financial support of GIZ, has utilised this approach for preparing slum upgrading plans (which include Ward Strategy Papers and Detailed Project Reports) in Raipur, India, as part of the Slum Free

Cities in India programme (RAY) (Eawag-Sandec 2012; Eawag 2013).

Other urban sanitation planning approaches

Conceptual links and parallel traditions

While it is possible to draw a direct conceptual link between Kalbermatten's original model and the subsequent development of SSA, HCES, Sanitation 21 and CLUES there are other urban sanitation planning approaches which have emerged from parallel traditions or developments. Despite their alternative provenance many show conceptual consistency with some of Kalbermatten's principles, and are discussed below.

GTZ ecosan approach (2003)

In 2003, the German Agency for Technical Cooperation (Deutsche Gesellschaft für Technische Zusammenarbeit), GTZ (now known as GIZ), developed a set of tools to encourage the use of ecological sanitation solutions. It is linked to the Bellagio principles but it strongly places ecological considerations at the heart of any sanitation intervention, with other objectives being secondary. Consequently, a 'toolbox' was developed to provide planning guidelines for so-called 'ecosan' technologies (Werner *et al.* 2003). The toolbox emphasises that 'ecological sanitation' is not synonymous with a particular technology but rather an idea that encourages recycling-oriented resource management (UNESCO and GTZ 2006). However, many observers conflate the use of the term 'ecosan' to the specific use of urine diverting dry toilets.

The approach incorporates a ten-step model, adapted from the HCES model containing the stringent requirement to recognise human excreta and water as a resource to be exploited rather than a waste (Werner *et al.* 2003). It also acknowledges the need for an 'enabling environment' to be in place but also highlights how elements of the environment may need to be refined to incorporate the 'ecosan' philosophy. This approach encourages a move away from conventional technology options to consider the use of a variety of technologies for the whole sanitation value chain. Although there are a number of schemes which

have used this approach there is little evaluative data available (UNESCO and GTZ 2006). Observations indicate that elements such as awareness raising and planning for reuse are more demanding as 'ecosan' is still a fairly unknown concept in many places (Panse *et al.* 2007).

Design for service approach (2009)

Recently the 'ecological' view of sanitation has prompted a serious reconsideration of the products of sanitation (specifically nutrients and water). Design for Service (DfS), a five-step planning approach developed by Ashley Murray as part of her doctorate (Murray 2009), presents a radical change of approach and highlights the importance of identifying sanitation solutions and participating with stakeholders at the downstream (reuse) elements of the sanitation value chain as a starting point. This planning approach emphasises the importance of health but also highlights the importance of the end-use functionality of the sanitation system to ensure the success of any system implemented. This may result in a reduction of conventional sanitation solutions as those solutions which provide the best downstream solution (i.e. for reuse) will be prioritised. The model has withstood some initial testing during its development in China and Ghana; however, further evaluation of its implementation and usefulness is required.

City Sanitation Plans

City Sanitation Plans (CSPs) are a recent development in urban planning departments in a number of countries. Taking a holistic approach to city planning enables CSPs to be embedded in city budgets and to relate constructively to other service provisions thereby addressing many of the implementation challenges faced by sanitation planners who would otherwise be working with technical departments alone. In a number of developing countries production of these plans by local government has been linked to financial incentives with the preparation of CSPs being required by state or central government. These plans take both technical and non-technical aspects associated with delivering sanitation at citywide level into consideration and many draw upon the fundamentals of the planning models and approaches identified in the earlier

sections. Frameworks and in-depth guidelines for CSPs have been developed by a number of supporting organisation in a variety of cities. In India a number of organisations have supported the National Urban Sanitation Policy for India. These include the WSP and Centre for Environmental Planning and Technology University (CEPT), GIZ, Bremen Overseas Research and Development Association (BORDA) and CDD (Consortium for DEWATS Dissemination Society); and the ICLEI – Local Governments for Sustainability (Government of India 2008; CEPT 2010; WSP 2010; BORDA 2012; GIZ 2012). WSP have also supported sanitation planning in Indonesia (WSP 2010) and beyond Asia, PS-Eua have supported local authority-led planning in various cities in West Africa (Eau 2012) and a number of experiences can be seen from Brazil (Aroeira *et al.* 2010; Warchow & Daronco 2013). Shortcomings have, however, been identified with the CSP approach and these, once again, primarily relate to the funding challenges first identified by Kalbermatten and the capacity/enabling environment gaps first identified in SSA (Government of India 2008; WSP 2010).

EMERGING CHARACTERISTICS AND CONCEPTS

Linear and parallel developments

Over the last 30 years a succession of multi-disciplinary teams have produced a series of credible planning frameworks which could be usefully deployed by local governments motivated to prepare serious urban sanitation plans. Within this review, approaches to urban sanitation planning can be seen to be broadly linear (with a few diversions along the way) and there is an encouraging consistency throughout indicating that the underlying planning process is well understood and will continue to be relevant into the future. There are other concepts that have emerged from within the sanitation sector and wider developmental arena, which have had varying levels of impact on the approaches taken to urban sanitation planning. The following section briefly explores some of those concepts, to assess how they relate to the World Bank's paradigm and identify how they are being implemented in practice.

Focus on health

The World Bank model proposed that any technology intervention should be implemented to maximise health benefits. This analysis has highlighted that some of the approaches developed have moved away from focusing on health, reverting instead to a focus on technological functionality, particularly ecological functionality. There is no evidence currently available to suggest that demoting health improves sanitation service delivery. For approaches such as the GTZ Ecosan Approach the focus on ecological functionality may result in prescribed technologies being promoted at the expense of others that may offer greater health benefits. In practice the enforcement of ecologically based technologies in urban areas has been shown to be difficult because of the complexities of the environment itself and the requirements needed for such a system to function properly (e.g. enabling environment). On a more general level, if the connection between improving sanitation conditions and health in urban areas is taken as a given, a shift away from health objectives may not be critical, provided that there remains a focus on improving access to services which work for as many people as possible. Perhaps here, Kalbermatten's main contribution was to prompt a consideration of objectives in the first place, which had rarely been the case up to that point.

Sanitation value chain

Since Bellagio, the idea of sanitation as a resource has been widely acknowledged and has become a key concept in urban sanitation. To be successful, it has to link collection of wastes (at the household level) via collection, transport and treatment to ultimate reuse or disposal of by-products. The early World Bank teams had a solid understanding of the technical 'sanitation value chain'; however, this understanding was so strongly embedded in the conventional approaches to sanitation that Kalbermatten challenged that it was never explicitly referred to in the World Bank approach.

The term 'sanitation value chain' has uncertain provenance but has been used increasingly in recent years by organisations including the Bill & Melinda Gates Foundation. It neatly illustrates the real technical and

institutional challenges of urban sanitation which has to function at both the private household level and the public network level. SSA made this dimension of urban sanitation more explicit through the introduction of institutional and technical unbundling along the value chain.

Despite the perceived benefits of viewing waste as a resource, there is little evidence that cities are moving towards viewing sanitation as a resource-generating sector. There is little evidence that any urban sanitation planning approaches have successfully stimulated reuse of the products of treated domestic wastewater. This is not surprising since it is not holistically incorporated into all stages of any of the planning processes discussed (Murray 2009). It also suggests a genuine challenge for the sector, namely that those people who currently control sanitation investments themselves do not value the resources of sanitation. There are numerous technical and cultural reasons for this with lack of knowledge and capacity playing a part. In countries with high capacity and severe resources constraints a much more progressive approach has been evident for many years (Kfoury *et al.* 2009). For such approaches to become more widespread, knowledge about appropriate treatment and post-treatment interventions are needed. To achieve this in practice a stronger focus on the downstream elements of the value chain (similar to that presented by the DfS tool) would be needed although gaining acceptance of this idea at community and city level remains challenging.

Sanitation ladder

The 'sanitation ladder' is a term widely used to describe a stepwise process by which communities or households may progressively experience improved sanitation. The idea recognises that sanitation imparts benefits of varying magnitude and differing nature depending on both the type of facility available to the user and the extent to which waste is subsequently well managed in the value chain. Often the focus of sanitation ladder analysis is on the household experience. Thus, for example, since 2008, the UNICEF/WHO Joint Monitoring Programme on Water and Sanitation (JMP) has reported global access to sanitation using a step scale from open defecation, via unimproved facilities to improved facilities, where 'improved' is a

technology-based indicator used as a proxy for sanitation which is more likely to deliver health benefits (WHO/UNICEF JMP 2012). Many commentators feel that access to 'improved sanitation' is a poor indicator towards progress (Shordt *et al.* 2004; Sutton 2008). Others note that the reporting in JMP creates incentives for countries to take a technology-based approach to regulation and policy which can hamper innovation (Kvarnström *et al.* 2011). This in turn reduces investment in the sanitation value chain as a whole.

To address these concerns Kvarnström *et al.* (2011) developed the 'function approach' ladder which moves away from describing pre-defined technologies and focuses on assessing the outcomes or effects of any given sanitation system. This approach assesses how excreta are managed throughout the whole sanitation value chain rather than just at the collection point and a resource-orientated focus is integral to the ladder. A clear focus of this approach is to put the health functions of the sanitation system at the earlier rungs of the ladder which, once achieved, then focuses on the environmental functioning of the system. This is in line with Kalbermatten's focus where health should be of primary importance. The ladder also highlights that sanitation provision is often a dynamic process where incentives may change as progress is made. In this sense it also brings forward the idea that the enabling environment can develop progressively as the ambition of sanitation interventions grows over time; that is, higher or later rungs on the ladder have higher costs and management and logistical requirements associated with them.

Enabling environment

Since Kalbermatten, an almost universal theme within urban sanitation planning has been the need for a conducive 'enabling environment'. This is said to define aspects of the political, economic, educational, socio-cultural, organisational, technological and legal framework (or sometimes, captured in the term 'institutional' in its broadest sense) within which the sanitation intervention operates (Peal *et al.* 2010). The concept indicates what needs to be in place for planning to be successful in practice (Eawag 2005). Another key factor sometimes noted is how the built environment can impact on the potential and outcome of

sanitation interventions (Peal *et al.* 2010). The concept of the 'enabling environment' is far broader than the need for inclusion of an interdisciplinary project team first noted by Kalbermatten, but the latter is clearly predicated on the former. Unfortunately, a common theme throughout the literature of urban sanitation planning, and in particular the small canon of case studies and evaluations, is the almost universal failure or absence of the required 'enabling environment'. CLUES practitioners try to address this problem in part by highlighting that it is not only vital to ensure that the correct stakeholders and sectors are included in the planning process but that those individuals and institutional bodies are aware of the importance of sanitation, have the capacity to deal with planning for and implementing sanitation interventions, that knowledge and understanding can be transferred between people and they can monitor and be held accountable for failings in providing acceptable outcomes. Nonetheless it is clear that in most cases the absence of the appropriate institutions and capacities severely constrains both willingness to prioritise sanitation in general and sanitation planning in particular, and the ability to handle the necessarily complex process of planning once it begins. Once low-income and informal settlements are included these failures only appear to become more marked.

Household participation

Household participation has become integral to all urban sanitation planning approaches. Participation has the potential to overcome lack of effective demand for sanitation on the ground and to help develop long-term project sustainability. Ensuring upstream users (households or communities) are included in the planning process helps develop a sense of 'ownership' (Mara 2005). This post-Kalbermatten shift in promoting the use of participatory approaches has not only been seen in the sanitation sector but also in water, health and hygiene. However, few studies have been completed which show how participation has been undertaken or which explore the relationship between participation and achieving long-term project success. Overall, studies which are available conclude that participation is often undertaken with a 'tick box' approach and that pre-defined objectives and expert-led solutions are actually

implemented with little understanding of what users really want (Jones 2003; Nance & Ortolano 2007; McConville 2010).

Commentators note that for participation to truly work it must be deeply institutionalised in order for both the process to be properly facilitated and for the 'state' to be responsive to the demands of the community. Evidence shows that those interventions which work best do so because of their ability to be sensitive and adaptable to variations in context (Reed 2008; Mansuri & Rao 2013). It is noted that the institutional structure within urban sector institutions could have an impact on how successful participation/demand-driven approaches are as they are typically set up with a supply orientated focus and therefore may not be adequately staffed or trained to undertake participation in reality (Cotton & Saywell 1998). Literature also suggests that participation should emphasise iterative and two-way learning between participants and stakeholders from very different knowledge and perspective backgrounds (Reed 2008) but in reality this cyclical process is rarely seen; there is usually limited honest informative feedback that helps to facilitate learning between the inner and outer circles of stakeholder groups (Mansuri & Rao 2013). This disconnect may be due to the nature of institutions and the incentives that drive individual action or it may be more closely related to issues of trust (Wright 1997). Once again it is the 'enabling environment' that appears to be critical, since participation needs to be underpinned by 'a philosophy that emphasises empowerment, equity, trust and learning for it to be successful' (Reed 2008). This takes two forms by ensuring the participants have the power to influence the decision and by ensuring participants have the technical capability to engage effectively with the decision (Reason & Bradbury 2008).

CHALLENGES FOR THE FUTURE

Planning in practice

Although sanitation has become more prominent on the global agenda, progress has not been made at the required scale and speed. In urban and peripheral urban areas in particular progress often fails to keep up with the pace of

population growth and coverage rates are actually falling (WHO/UNICEF JMP 2012). In urban areas improved planning is likely to be a part of the solution although not the entire solution. What is perhaps most striking about urban sanitation over the past 30 years is the lack of evaluation of implementation experiences of approaches discussed in this paper. This is not surprising as in reality, sanitation in urban areas is said to be delivered in an *ad hoc* fashion, if at all, and few cities identify it as an investment priority or are prepared to invest time and resources in planning for efficient and effective service delivery (Tayler & Parkinson 2005). Even where sanitation planning is undertaken, experience suggests that capacity and skills gaps persist. Numerous commentators have noted how lack of knowledge of new developments results in the propagation of old-fashioned approaches and solutions which do not meet the needs of people (Nance & Ortolano 2007; McConville 2010; Lüthi & Kraemer 2012). In particular 'participation' does not appear to be yielding the results expected in terms of improved, better tailored and effective local solutions. Wright (1997) identifies that the challenge for governments and donor agencies is to motivate and build the capacity of the different stakeholders to participate in appropriate and productive ways. This coincides with others who note that adequate sanitation knowledge is required at the local level to achieve universal sanitation access (Mara 2013). Large capacity deficits exist at all levels in key water and sanitation agencies in most low income countries caused by adverse institutional structures and systems of incentives as well as insufficient funds (Cavill & Saywell 2009; DFID *et al.* 2010).

Learning from the past

There is a lack of case-study evidence regarding the implementation of urban sanitation planning approaches and where there is evidence this is mainly based on short-run reporting rather than ongoing monitoring or repeat evaluations of success. The SSA approach, for example, was identified as a success based on several case studies which were published during the planning phase and shortly after but since then little continuous monitoring and reporting of its ongoing success has taken place. This lack of long-term monitoring creates gaps in knowledge about the real

impact of interventions and reduces potential learning for the future as most evaluations and reporting take place immediately after the project is implemented (FAO 2010; Jones *et al.* 2013; Mansuri & Rao 2013). Few urban sanitation planning approaches place much emphasis on accountability – which would require both an explicit definition of outcomes and the development of associated monitoring and evaluation processes. Accountability is implicitly assumed to arise through processes of participation but there is no evidence that this actually happens in practice.

Knowledge gain through experience seems to be implicit in the successive and cumulative development of increasingly sophisticated planning approaches outlined here, but there is almost no record of the basis upon which those developments were made. Conclusive evidence regarding the relative importance of the various planning principles underpinning these approaches could potentially be generated if case studies could be revisited; the cohort of well-documented planning approaches described here provides a potentially fascinating basis for a historical review of the impact of planning on sanitation service delivery. For future interventions, greater attention to long-term monitoring would also be highly valuable and enable lessons to be learned and shared more openly.

Inherent problems for urban sanitation planning

Across all the approaches covered in this paper there appears to be recognition of some common constraints to effective sanitation planning and associated sanitation investments. Lack of political will is cited on numerous occasions, evidenced by the low priority given to sanitation via government policies and budgets (Tayler & Parkinson 2005; Cairncross *et al.* 2010). Although more market-based and participatory planning models can achieve some traction at the local level, the physical nature of the urban environment and the need to manage some aspects of sanitation collectively, means that public support (and successful participation) will always be needed to ensure that the entire sanitation value chain functions. Local demand for improved environmental conditions will rarely be sufficient to support the costs and institutional challenges of coordinated sanitation in the urban space. Thus urban sanitation always requires an explicit institutional

commitment to planning and service delivery (Evans 2005; Tayler & Parkinson 2005). However there is an inherent problem in those public institutions who are mandated to deliver such services as they generally appear to have low capacity and to be severely under-resourced (Evans 2005; Cairncross *et al.* 2010). They also tend to lack a planning culture being more commonly focused on addressing crises in an *ad hoc* and non-systematic way (Tayler & Parkinson 2005). Their ability to plan for and engage with communities and households in order to understand and influence household behaviours and the role of community action as a means to creating an 'enabling environment', thereby achieving increased demand for sanitation, is also usually weak (Evans 2005). Finally, these institutions are inherently unable to hold themselves accountable through the collection of credible evidence for monitoring purposes and evaluation of their progress (*ibid.*).

Going forward

It is evident that the challenges of delivering urban sanitation go beyond the need for better planning. The institutional constraints that hold back planning and investment in such an essential service generally constrain all aspects of urban governance; provision of most critical services, from housing to education, remains *ad hoc* and chaotic in many rapidly growing poor cities. Nonetheless, sanitation can be seen as a touchstone for urban governance; a city which can provide its citizens with a functioning, articulated urban sanitation system is well placed to deliver much more. But similarly, the delivery of urban sanitation cannot surmount structural failings in the city at large; a rational sanitation plan is no match for politically motivated land developers intent on withholding basic services from unplanned settlements. Perhaps the critical point here is this: just as Kalbermatten called for an iterative planning process based on understanding of what is on the ground already, sanitation planners need to invest more time in understanding the nature of the problem to be solved and the capacity of the existing systems to address those problems. We may wring our hands at the failure of the enabling environment, but perhaps we could achieve more by working with what exists and doing at least part of the job in the right way and in the short term. The

recent focus on the sanitation value chain and ecological objectives tends to push decision makers towards achieving the perfect complete system in one leap, but the functional sanitation ladder should remind us that even sanitation system development can be progressive, with progressive marginal gains keeping step with progressively strengthening institutional capacity.

LIMITATIONS

This paper is a partial and biased consideration of progress in urban sanitation. There are of course other sanitation planning approaches and perspectives to be seen in the literature but the authors have attempted to bring focus to this analysis by taking as a starting point the four principles articulated by the World Bank team in the 1970s. The very limited empirical data mean that such a review must be highly speculative. Furthermore, the very wide range of contexts in which we seek to address the urban sanitation challenge mean that the conclusions drawn here are generalised rather than specific to any given case. Despite these limitations we feel that it is possible to trace the influence and linkages of successive attempts to articulate effective urban sanitation planning tools and to use this as a pointer towards more effective interventions in the future.

CONCLUSION

This study has established how John Kalbermatten and the World Bank model impacted upon urban sanitation planning and how subsequent planning approaches 'evolved'. The paper sought to demonstrate conceptual links and tensions between the differing perspectives of optimising health gains, increasing the repertoire of potential technical solutions, multi-disciplinarity, the sanitation value chain, the functional sanitation ladder, the enabling environment, and participation.

The trajectory of change is complex; firstly, the focus on health has increasingly been challenged by a move towards a focus on achieving ecological outputs within sanitation and the need to holistically achieve access along the whole sanitation value chain. The introduction of 'enabling

environment' is more sophisticated than the call for multi-disciplinarity. As identified by Kalbermatten, household participation is still inherent to every planning approach, despite the lack of evidence about how best to do it, or indeed, the relationship between participation and long-term success of the approaches on the ground. However, beyond this, we would argue that real progress in the sector cannot occur without better evidence of what really works. We need a commitment to better long-term monitoring and evaluation of the effects of urban sanitation planning and its connection to investment and improved service delivery. If, in the process, we can also contribute to building a stronger enabling environment, greater capacity, more effective participation and more accountability this will all be to the good; John Kalbermatten would have asked for nothing less.

ACKNOWLEDGEMENTS

This PhD research is funded by the UK Engineering and Physical Research Council through the project, 'A global solution to protect water by Transforming Waste' (EP/J00538X/1).

REFERENCES

- Aroeira, R. d. M., Braga, R. A., Pereira, M. D., Aguiar, I. M. C., Virgínia, C. & Alves, P. 2010 The Municipal Sanitation Plan for the City of Belo Horizonte: Le plan d'assainissement de la ville de Belo Horizonte. [Online]. Available at: <http://documents.irevues.inist.fr/bitstream/handle/2042/35641/13106-043DEM.pdf> (Accessed: 20/09/2013).
- Black, M. 1998 1978–1998. *Learning What Works: A 20 Year Retrospective View on International Water and Sanitation Cooperation*. UNDP-World Bank Water and Sanitation Program, Washington, DC.
- BORDA 2012 Implementation of decentralised sanitation approaches through pilot interventions in Indian cities of Raipur, Chhattisgarh State and Kochi, Kerala State. Available at: <http://www.borda-sa.org/news/newsdetails-south-asia/article/implementation-of-decentralised-sanitation-approaches-through-pilot-interventions-in-indian-cities-0.html> (Accessed: 20/07/2013).
- Cairncross, S., Bartram, J., Cumming, O. & Brocklehurst, C. 2010 *Hygiene, sanitation, and water: what needs to be done?* *PLoS Med* 7 (11), e1000365.

- Cavill, S. & Saywell, D. 2009 The capacity gap in the water and sanitation sector. *34th WEDC International Conference*. WEDC, Addis Ababa, Ethiopia.
- CEPT 2010 *Performance Measurement Framework for Urban Water and Sanitation Vols I and II*. Ahmedabad, India.
- Colin, J., Ceetelaar, C., Utomo, T. & Blackett, I. C. 2009 *Urban Sanitation in Indonesia: Planning for Progress*. Field note. Water and Sanitation Program - East Asia and the Pacific Jakarta, Indonesia.
- Cotton, A. & Saywell, D. 1998 *Strategic Sanitation Approach: A review of literature. Operational Implications*. Water, Engineering and Development Centre (WEDC): DFID KAR Project No. R6875. Available at: <http://www.lboro.ac.uk/garnet/ssacover.html> (Accessed: 23/09/2013).
- DFID, IWA and UKAid 2010 *World Water Week*. Stockholm. Available at: http://www.worldwaterweek.org/documents/WWW_PDF/2010/monday/K24/sue_mind_gap.pdf.
- Eau, P. S. 2012 *Stratégies municipales concertées*. Available at: www.pseau.org/smc (Accessed: 22/07/2013).
- Eawag 2005 *Household Centred Environmental Sanitation: Implementing the Bellagio Principles in Urban Environmental Sanitation*. Switzerland.
- Eawag-Sandec 2012 *Validation of the Community-led Urban Environmental Sanitation Planning (CLUES)*. Switzerland.
- Eawag 2013 Beratung der indischen Regierung zur Umsetzung der National Urban Sanitation Strategy. Final Report, Switzerland.
- Evans, B. 2005 *Securing Sanitation: The Compelling Case to Address the Crisis*. International Water Institute, Stockholm, Sweden.
- FAO 2010 *The use of Monitoring and Evaluation in Agriculture and Rural Development Projects: Findings from a Review of Implementation Completion Reports*. Rome, Italy.
- GIZ 2012 *Support to the National Urban Sanitation Policy (NUSP)*. Germany. [Online]. Available at: <http://www.giz.de/en/downloads/giz2012-national-urban-sanitation-policy-india-en.pdf>.
- Government of India 2008 *National Urban Sanitation Policy*. New Delhi, India.
- IWA 2006 *Sanitation 21: Simple Approaches To Complex Sanitation: A Draft Framework For Analysis*. International Water Association, London.
- Jones, P. 2003 *Urban regeneration's poisoned chalice: is there an impasse in (community) participation-based policy?* *Urban Studies* **40** (3), 581.
- Jones, S., Greene, N., Hueso, A., Sharp, H. & Kennedy-Walker, R., 2013 *Learning from Failure: Lessons for the Sanitation Sector*. Discussion paper. UK Sanitation Community of practice, London. Available online at http://www.bpwds.org/web/d/DOC_360.pdf?statsHandlerDone=1.
- Kalbermatten, J. M., Julius, D. S. & Gunnerson, C. G. 1982a *Appropriate Sanitation Alternatives: A Technical and Economic Appraisal*. International Bank for Reconstruction and Development/The World Bank, Johns Hopkins University Press, Baltimore.
- Kalbermatten, J. M., Julius, D. S., Gunnerson, C. G. & Mara, D. D. 1982b *Appropriate Sanitation Alternatives: A Planning and Design Manual*. International Bank for Reconstruction and Development/The World Bank, Johns Hopkins University Press, Baltimore.
- Kalbermatten, J. M., Middleton, R. & Schertenleib, R. 1999 *Household-Centred Environmental Sanitation*. Swiss Federal Institute for Environmental Science and Technology, Switzerland.
- Kfoury, C., Mantovani, P. & Jeuland, M. 2009 Water reuse in the MNA Region: constraints, experiences, and policy recommendations. In: *Water in the Arab World: Management Perspectives and Innovations* (V. J. Jaganathan, A. S. Mohamed & A. Kremer, eds.). World Bank, Middle East and North Africa Region, Washington, DC, pp. 447–477.
- Kvarnström, E., McConville, J., Bracken, P., Johansson, M. & Fogde, M. 2011 *The sanitation ladder – a need for a revamp?* *Journal of Water, Sanitation and Hygiene for Development* **1** (1), 3.
- Lüthi, C. & Kraemer, S. 2012 *User perceptions of participatory planning in urban environmental sanitation*. *Journal of Water, Sanitation and Hygiene for Development* **2** (3), 157–167.
- Lüthi, C., Morel, A., Tilley, E. & Ulrich, L. 2011 *Community-Led Urban Environmental Sanitation Planning: CLUES*.
- Mansuri, G. & Rao, V. 2013 *Localizing Development: Does Participation Work?* World Bank, Washington, DC.
- Mara, D.D. 1996 *Low Cost Urban Sanitation*. John Wiley, New York.
- Mara, D. D. 2005 *A New Paradigm for Water Supply and Sanitation in Cities, Towns and Large Villages in Developing Countries*. UN-HABITAT.
- Mara, D. 2013 *Pits, pipes, ponds - And me*. *Water Research* **47** (7), 2105–2117.
- McConville, J. R. 2010 *Unpacking Sanitation Planning: Comparing Theory and Practice*. Chalmers University of Technology, Gothenburg, Sweden.
- Morella, E., Foster, V. & Banerjee, S. G. 2008 *Climbing the Ladder: The State of Sanitation in Sub-Saharan Africa*. The International Bank for Reconstruction and Development/The World Bank, Washington, DC.
- Murray, A. E. 2009 *Don't Think of 'Waste'water: Evaluation and Planning Tools for Reuse-Oriented Sanitation Infrastructure*. University of California, Berkeley.
- Nance, E. & Ortolano, L. 2007 *Community participation in urban sanitation: experiences in Northeastern Brazil*. *Journal of Planning Education and Research* **26** (3), 284–300.
- Panse, D., Heeb, J. & Satish, S. 2007 UNESCO-IHP Symposium Paris, 12–14 September 2007.
- Peal, A., Evans, B. & Voorden, C. v. d. 2010 *Hygiene and Sanitation Software: An Overview of Approaches*. Water Supply & Sanitation Collaborative Council, Geneva, Switzerland.
- Reason, P. & Bradbury, H. 2008 *The Sage Handbook of Action Research: Participative Inquiry and Practice*. SAGE publications, London.

- Reed, M. S. 2008 *Stakeholder participation for environmental management: a literature review*. *Biological Conservation* **141** (10), 2417–2431.
- Rohrer, T. 2010 *106th Aguasan meeting, Bem, 9 September 2010*. HELVETAS and Swiss Association for International Cooperation, Béma, Burkina Faso.
- Shordt, K., Wijk, C. v. & Brikké, F. 2004 *Monitoring Millennium Development Goal for Water and Sanitation: A Review of Experiences and Challenges*. IRC International Water and Sanitation Centre, The Hague.
- Sutton, S. 2008 *33rd WEDC International Conference, Accra, Ghana*. WEDC, Loughborough University, UK.
- Taylor, K. & Parkinson, J. 2005 Strategic planning for urban sanitation: a 21st century development priority? *Water Policy* **7** (6), 569–580.
- Taylor, K., Colin, J. & Parkinson, J. 2000 *Strategic Planning for Municipal Sanitation: A guide*. GHK Research and Training, London.
- UNESCO and GTZ 2006 Capacity building for ecological sanitation: concepts for ecologically sustainable sanitation in formal and continuing education.
- Vezina, M. 2002 The ouagadougou strategic sanitation plan: an holistic approach to a city's problems.
- Wartchow, D. & Daronco, G. C. 2013 Santa Rosa leads the way on Brazilian municipal sanitation plans. *Water* **21**, 15.1, 43–44.
- Werner, C., Panesar, A., Bracken, P., Mang, H. P., Huba-Mang, E., Gerold, A. M., Demsat, S. & Eiche, I. 2003 *An Ecosan Source Book: For the Preparation and Implementation of Ecological Sanitation Projects*. Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH, Germany.
- WHO/UNICEF JMP 2012 Progress on drinking water and sanitation: 2012 update MDG assessment report. World Health Organization and UNICEFs Joint Monitoring Programme.
- Wright, A. M. 1997 *Toward a Strategic Sanitation Approach: Improving the Sustainability of Urban Sanitation in Developing Countries*. UNDP-World Bank Water and Sanitation Program, Washington, DC.
- WSP 2000 *Urban Environmental Sanitation Planning: Lessons from Bharatpur, Rajasthan, India Water and Sanitation Program*. South Asia, New Delhi. [Online]. Available at: http://www.wsp.org/sites/wsp.org/files/publications/sa_bharatpur.pdf.
- WSP 2010 Marching together with a citywide sanitation strategy. In: *Water and Sanitation Program*; Technical Team for Sanitation Development (Tim Teknis Pembangunan Sanitasi – TTPS) & the Indonesia Sanitation Sector Development Program (ISSDP).
- WSSCC, S. 2000 Report of the Working Group on Environmental Sanitation to the 5th Global Forum of the WSSCC in Iguazu, Iguazu.

First received 22 April 2013; accepted in revised form 8 August 2013. Available online 22 October 2013