The current story of the Democratic Republic of the Congo is a story of contradiction. There is an extreme potential for wealth, yet there isn't the ability to sustain even the most basic of necessities. One of the most concerning basic necessities that is not widely available is clean water.

The DR Congo is Africa's most "water-rich" country and is facing an acute drinking water supply crisis. As of 2009, the most accurate study showed that only an estimated 26% of its population has access to safe drinking water, well below the approximately 60% average for Sub-Saharan Africa. Due to the deteriorated state of its water infrastructure – undermined by years of underinvestment and conflict – and a rapidly growing population, the trend in water supply coverage was until recently in regression. Social and public health consequences of water service breakdown have been considerable. The poorest sections of society have been disproportionately impacted by the decline in service delivery and rising water costs, both in rural areas but increasingly in rapidly urbanizing cities. The inability to provide access to clean water has put a huge burden in every area of life.

Based on the most recent and most accurate estimates (2010), only around 26% people of the DRC's population of 67.8 million – equivalent to 17.6 million people – have access to safe drinking water, well below the approximately 60% average for SubSaharan Africa. This means that almost 51 million people do not have access to clean water. Those who live in rural areas suffer the most, especially those villages of fewer than 100 persons, estimated in 1990 to comprise up to 37 per cent of the rural population.

In the DRC's administratively fragile context, uncontrolled land development activities pose a fundamental threat to strategic drinking water sources. Weak land-use planning and inadequate protection of critical water sources – at all levels from village springs to the intakes of water treatment plants – represent a direct risk to the wellbeing of the DRC. The long-term sustainability of water infrastructure investments are frequently jeopardized by the resultant environmental degradation. Increasing deforestation and degradation of forest ecosystem services represents a direct threat to local community water supply. This is particularly the case in rural areas, where over 90 percent of the population depends on springs located in dense forests.

With the gradual unravelling of state capacity and ensuing post-conflict vacuum, provision of water services in rural and peri-urban areas has become almost completely in formalized and consequently is not subject to independent oversight. Due to the generally low technical expertise of the diverse actors active in rural and peri-urban areas, construction quality and maintenance of water supply structures has been compromised, with serious public health implications.

While major water infrastructure development is important, implementation of small-scale projects in the DRC often reach a larger beneficiary population and provide greater returns per investment unit made. Innovative strategies such as autonomous community-based water supply systems and low cost technical solutions (public standposts, spring boxes, hand pumps) promoted by various development partners (BTC, KfW, UNICEF) offer promising solutions.

Rural • Low access to improved water sources.

- 60 per cent of rural water systems not operational.

- Inadequate quality control and maintenance.
- High incidence of bacteriological contamination.
- Low investment allocations (15 per cent of total).
- Physical degradation of drinking water sources.

Importance of springs and groundwater in drinking water supply

Springs comprise the main source of drinking water, estimated to supply up to 90 per cent of DRC's rural population. No inventory of springs exists at the national and provincial levels. For the most part, these comprise simple, capped springheads that are widely used in dispersed villages, and also in the rapidly growing peri-urban areas. There are only an estimated 1,000 deep-drilled wells in the DRC, providing service coverage for a small proportion of the population. Most of these wells were constructed between the 1960s and 1980s, especially during the International Decade for Water Supply and Sanitation. Since the 1990s, limited well drilling has been carried out, though in the past several years it has been rapidly developing with international assistance. Most of the groundwater is otherwise exploited using dug wells in addition to hand and mechanical pump wells, which is estimated to account for approximately 10 per cent of the drinking water supply.

A preliminary estimate for six provinces indicated that raising water access to 60 per cent by 2020 would require inter alia the development of 11,875 springs including 716 reticulated supply systems, 13,056 hand and pump wells and 707 electrically pumped deep boreholes. It also underlines the importance of data collection systems and hydrogeological studies in providing adequate information to plan efficient and sustainable use of groundwater resources.

Water sector governance

Water sector governance is structurally weak, characterized by a multiplicity of laws and institutions with often overlapping and conflicting mandates. Other key ministries include the Ministry of Rural Development, whose national rural waterworks service (SNHR) is in charge of developing rural and peri-urban drinking water supply services SNHR's institutional status remains uncertain, hampering it from formulating a long-term action plan and mobilizing resources. A recent government-commissioned study has proposed transforming SNHR from an implementing agency into a coordinating and regulatory body for water supply in rural areas.

However, the SNHR is likely to retain some executing capacity, particularly for borehole drilling operations and has reportedly recently received around 38 borehole drilling rigs.

The role of NGOs

During the conflict years, a plethora of international and national NGOs moved to fill the shortfall in drinking water services as part of the overall humanitarian and emergency relief effort. Poorly

coordinated and typically comprising targeted one-off activities, the performance of NGO projects has generally been wanting. As a result, NGO interventions have not succeeded in generating a sustainable improvement in water coverage. Nevertheless given the scale of drinking water needs and the weakness of government services, NGOs have a vital role to play in reaching otherwise inaccessible areas. Strengthening the technical and resource mobilization capacity of NGOs is therefore a critical strategy to maximize and improve water service delivery.

International Assistance

International development partners have historically played a critical role in the development of the DRC's water sector. Following a decade-long suspension of donor assistance starting in the early 1990s, many development partners had by 2005 re-engaged in the water sector. Today, international aid accounts for almost 95 per cent of total investments in the water sector, equivalent to around $62 million per annum. Donor financial commitments are significantly higher, estimated at $171 million per annum over the period 2007-2008. Project implementation, however, has trailed behind with only 38 per cent disbursement rate. The resultant delay in project delivery is largely due to limited technical capacity, logistical constraints and complex project application procedures.

Rural water sector assistance is essentially channeled through two programs: "support for autonomous community-based water supply systems" that is financed by four main donors, namely Belgium Directorate General for Development Cooperation (DGCD), UK Department for International development (DFID) , the European Union (EU) and French Development Agency (AFD), and the "Sanitized Villages" program with support from the United Nations Children's Fund (UNICEF), Japanese International Cooperation Agency (JICA), United States Agency for International Development (USAID) and UK-DFID.

Rural water supply: a historically weak and neglected sector

The drinking water crisis has a strong rural dimension, where the majority of the population without access to potable water resides. Indeed, the Minister of Planning recently stated that "it is here that the DRC's water battle will take place."

In addition to the SNHR, key players in the rural water sector include UNICEF, BTC, OXFAM and CICR. Despite a reversal of the declining trend, the rural water supply sector remains marginalized, receiving only 15 per cent of overall water supply investments.

Despite the aforementioned progress, of the DRC's approximately 44 million rural inhabitants in 2010, approximately 7.5 million people had access to safe drinking water. A key feature of the rural water sector is the poor and derelict state of its infrastructure. An estimated 60 per cent of existing rural water works is no longer operational due to lack of maintenance and spare parts.

It should be further noted that most rural water systems were constructed between 1983 and 1990 as part of the International Drinking Water and Sanitation Decade. Between 1991 and 2003 there was minimal investment in the sector and most interventions undertaken as part of emergency and humanitarian operations.

Due to the poor quality of its construction, most of this "humanitarian infrastructure" has fallen into disrepair. Springs are the main source for rural water supply in the DRC and typically require minimal investment to develop and maintain. It is estimated that on average 90 per cent of the rural population uses springs for their water supply, particularly in dispersed villages of fewer than 500 persons. For the most part, springs are exploited without adequate development and protection. Moreover, where developed, the quality of spring protective structures was observed by UNEP to be of generally poor standard and inadequate maintenance. The remainder of the rural population mainly relies on shallow wells, using both hand and machine pumps. Small, piped distribution systems, boreholes and rainwater harvesting structures account for an insignificant proportion of overall rural water supply.

For large village settlements as well as peri-urban areas, current investments aim to expand borehole drilling and small piped networks that would typically serve a population of between 2,000 and 5,000 persons.

The strategy is to have these small water supply networks managed by autonomous community-based associations as well as local private firms. Successful experiences have been developed by BTC and others in both rural and peri-urban communities in Bas Congo, Kasaï Oriental, Kinshasa and South Kivu, which need to be replicated and scaled up.

For small, dispersed villages with typically 500-1,000 inhabitants, the national programming strategy is centered on the "Village Assaini" ("Sanitized Villages") model launched in 2006 and implemented by the Ministry of Public Health with support from UNICEF and other development partners. The program marks a critical turning point from emergency and ad hoc rehabilitation interventions to systematic development of the rural water sector. One of the key elements in this integrated concept is to improve the quality of drinking water sources by tapping springs and constructing shallow wells through community mobilization and capacity building.

The program, which has an annual budget of approximately $20 million per annum has not reached it's goals because of key challenges facing are lack of technical know-how as well as multiple logistical and institutional constraints.

Villages of fewer than 100 persons, estimated in 1990 to comprise up to 37 per cent of the rural population, are considered not viable and are therefore not typically targeted under current programs to expand water coverage. While the proportion of these small population clusters is likely to have declined in recent years due to migration and urbanization, they nonetheless constitute a significant part of the rural population. In addition to SNHR and the Ministry of Public Health, a variety of international agencies, development partners and numerous NGOs, as well as private contractors, are actively engaged. The lack of a structured institutional framework, however, has created serious gaps in coordination, engineering quality control and maintenance of rural water systems. SNHR, which has the

general mandate over the rural water supply subsector, is seriously lacking in personnel, capacity and financial resources to exercise effective leadership. Its physical presence in the provinces is thin and virtually absent over large rural areas. Its geographic scope of operation is patchy and limited to a small radius around its 17 hydraulic stations, which are moreover only partially operational due to obsolete equipment requiring replacement. Where it is represented, SNHR lacks practical means and functions largely on an ad hoc basis, mainly providing advisory services to humanitarian interventions and NGO projects.

Moreover, most of SNHR's employees are not registered civil servants, but are instead on short-term contract. It is therefore perhaps not surprising that a significant number of SNHR's staff have opted to work for NGOs and the private sector. The resulting shortfall in SNHR's human expertise poses an important challenge as new recruits have limited experience.

Degradation of drinking

The immediate challenge on the ground is the on-application of basic zoning principles and land delineation procedures for drinking water source protection. Nonexistence of demarcated protection zones was observed in all water source categories from village springs and wellhead areas to the water intakes of REGIDESO's treatment plants.

The greatest threats to water supply sources were observed during site inspections to include modification of runoff patterns, accelerated erosion and landscape degradation. These problems are mainly caused by agricultural encroachment and deforestation, disorderly housing development and poor road construction including that of pedestrian pathways in rural areas.

Poor construction and maintenance of rural water systems

As government capacity to provide water services deteriorated, its functions were progressively assumed by other actors. This trend is particularly manifest in rural and peri-urban areas, as REGIDESO – despite serious constraints – maintained its command over urban water supply within city centers. In rural and peri-urban areas, however, a wide range of international and national NGOs, civil society and faith-based organizations, private sector enterprises, UN and development agencies gradually took over the role of the state in providing water services. This gradual "outsourcing" of the state's responsibility in the water sector has been largely sanctioned by donor support, who started channeling their assistance through non-state actors following the suspension of international cooperation with Congo's government from 1992-2001. SNHR, mandated to service rural and peri-urban populations, was particularly impacted by the discontinuation of international cooperation, as its operations relied heavily on donor funding. Whereas REGIDESO started to receive external assistance in 2002, most notably in the form of several megaprojects from the World Bank and African Development Bank (AfDB), SNHR has benefited from minimal international assistance. Consequently, SNHR's capacity has been seriously undermined to the point where it has become almost a negligible player on the ground. Within the ensuing rural water supply governance vacuum, a multitude of actors from national and international

NGOs to religious organizations and private contractors expanded their scope of work to include drinking water provision. While these actions are well intentioned and provide essential services during humanitarian emergencies, ensuring the quality and sustainability of water supply structures is of critical importance given its potential impacts on public health. The importance of strengthening NGO technical capacity cannot be overemphasized as they have a crucial role to play in improving water service delivery, particularly in remote areas. Simple point source structures As previously mentioned, an estimated 90 per cent of the rural population relies on springs for its drinking water supply. Most of the springs are located in dense forests (both gallery and equatorial), highlighting the importance of forest ecosystem services to local community water supply. For small, dispersed communities of fewer than 1,000 people, spring development and protection is essentially based on various spring box designs. While spring box technology is simple and inexpensive, a minimum level of technical engineering expertise is nevertheless required to ensure that they provide safe and adequate water. Unfortunately, UNEP observed that many of the actors involved lack the expertise and competence to build robust spring protection structures.

Another important shortfall is the almost total lack of water quality testing. While spring water is generally safe, the risk of contamination, particularly given the poor quality of construction, is an issue of concern. UNEP carried out spot check water tests of 15 spring boxes for bacteriological contamination. All samples showed the presence of total coliforms signifying a strong likelihood of pollution by surface runoff. Pathogenic Escherichia coli bacteria were found in slightly over 50 per cent of the water samples, indicating fecal. It is therefore important to systematically control for bacteriological contamination using simple field kits, which can be carried out by the local health centers. Laboratory testing should be carried out on a semi-annual or annual basis for more detailed analysis of key parameters including bacteria, nitrates, turbidity and conductivity. In addition, operators should be trained to regularly observe any changes in turbidity, particularly following rainstorms as this would indicate that runoff is reaching the spring. Physical access to the water points is another major constraint in improving the quality of rural water service. The generally accepted standard is that the distance to the consumer in rural areas should be within 500 meters. Although the distance to the springs is in many cases within 1 kilometer, it was observed that a large proportion were located in steep valleys, particularly in deep gallery forests in the savanna belts and sharp hillsides in the eastern part of the country. Water transport, almost exclusively done by women and children, is as a result a highly laborious and time-consuming chore. In some locations, the access slope is so steep that the risk of falls and injuries is high. It is important that the selection of these sites carefully consider site accessibility issues. Moreover, there is a risk that water points in steep terrain develop erosion problems that compromise the integrity of the water source.

Even though spring boxes and simple headwalls need only limited attention, they are not maintenance free. Community engagement is therefore critical for the successful operation and maintenance of spring structures. It is also equally important that operation and maintenance not be limited to infrastructure and that source protection and micro catchment management is incorporated as an integral component. As spring boxes are low-cost structures, the common development approach promoted by many NGOs is to mobilize community work, known as salongo, for their construction.

While this voluntary approach may work in the initial set-up phase, it is inadequate to assure periodic maintenance and rehabilitation. In reality, community ownership was observed to be low and furthermore they generally lacked the technical skills to ensure proper upkeep. On the other hand, communities typically expected maintenance and rehabilitation to be carried out by the organization that installed the structure, the government or a potential donor. A voluntary community caretaker approach to maintain spring protection structures is therefore unlikely to be a sustainable strategy over the long term. Even where designated water committees had been established, it was found that these often subsequently unraveled or were subsumed under broader local development committees. While one of the key components of the "Village Assaini" program is the establishment of local water committees, social mobilization to promote community ownership and responsibility for the maintenance and operation of spring structures was often cited to be a major challenge. Although the construction of spring protection structures can be completed in a matter of days or weeks, community participation is a long-term process that requires consistent advocacy, awareness raising, training and follow-up. It t is difficult, however, to have an effective social mobilization component under the short-term donor funding cycle associated with small water supply projects. Even though the economic base of rural communities is fragile, communities should be empowered to become self-reliant by convincing users that they would be better off making even minimal payments (both in cash or in kind) to ensure sustainable operation and maintenance of water supply structures. To improve the quality of spring development structures, UNICEF recently initiated collaboration with SNHR to provide technical supervision and inspection of installations. This is a positive step that needs to be promoted and expanded. In the meantime, SNHR participation remains on a selective and project basis and its role is essentially that of a technical consultant. Other actors generally bypass SNHR and operate beyond any form of official oversight. As a result, not only are there no common standards, construction supervision and accountability, but even an inventory of existing structures is lacking. The resulting informalisation of water service provision in rural and peri-urban areas represents a major challenge for effective coordination and investment planning in the sector.

There is a great lack of systematic monitoring and follow-up of water supply structures is an important shortcoming. It is therefore important that international organizations establish a more structured cooperation with SNHR and strengthen its capacity to coordinate activities and enforce compliance with minimum standards. In emergency situations where SNHR may not be active, it is important that the UN Office for the Coordination of Humanitarian Affairs (UN-OCHA) and the Water Sanitation and Hygiene (WASH) Cluster set up a mechanism and dedicate resources to supervise construction standards and ensure regular follow up of drinking water structures as an integral part of rapid humanitarian response. Rural and peri-urban autonomous water supply systems although of a different technology type and scale, the problems of construction quality and maintenance also applies to autonomous rural water supply systems. These comprise either gravity flow or borehole systems that service a beneficiary population ranging from 3,000 to over 30,000 persons. A survey commissioned by the World Bank and Water and Sanitation Program (WSP) in 2005 found that most of the DRC's rural water systems were of poor construction quality. It also decried the fact that water supply systems were being built by a profusion of non-specialized actors who had limited or no professional experience in the water sector.

Donors were partly held responsible for this disarray by funding interventions from unqualified intermediaries

The WSP survey found that around 50 per cent of water supply systems had broken down due to poor quality construction. Most of these systems were constructed in the last 10 years and date from after the year 2000. Only rarely was water system failure attributable to aging infrastructure or poor maintenance. The WSP assessment also emphasized the need to shift from a “charitable” and “voluntary” management approach of water systems to one that is based on cost recovery. In addition, the study highlights the need to train and professionalize water committees to ensure adequate maintenance and sustainability of water systems.

Water Pollution

As the DRC lacks a national water quality monitoring program it is difficult to empirically evaluate the nature and magnitude of potential water pollution. In addition, there are no functional monitoring stations from which it would be possible to extrapolate general water quality status and trends. Water quality studies, both of surface and groundwater, are for the most part undertaken on an ad hoc basis and conducted as part of targeted research and academic projects. Systematic monitoring, both in the rainy and dry seasons, as well as for a wider range of parameters including persistent organic chemicals, is necessary to obtain a reliable overview of water quality. It should also be highlighted that post-treatment contamination is a potential problem given the debilitated state and extensive leakages in the water supply network. Indeed, UNEP analysis revealed widespread bacteriological contamination of drinking water supplies, both in urban and rural areas. Moreover, the Pool Malebo on which Kinshasa is situated is the receiving basin for municipal, agricultural and industrial effluents as well as urban surface runoff exposing this ecosystem to potential contamination. More detailed pollution studies are required on this section of the Congo River, particularly on bioaccumulation risks. The two main sources of water pollution are: (i) biological contamination from uncontrolled sewage and solid waste disposal and (ii) elevated suspended sediment loads from poor land use practices and management.

Biological water pollution

The principal source of biological pollution in the DRC is the direct release of raw sewage in water courses or indirectly via seepage into groundwater. Only 10 per cent of the population has access to sanitation services.

As there are no functioning sewage treatment plants, including in Kinshasa, untreated sewage is released through the main drains directly into rivers and lakes. Waste from septic tanks and pit latrines are typically openly dumped in the environment including in canals and water bodies. Random open defecation in peri-urban and rural areas is common, thereby exposing water sources to potential contamination. Where it exists, the sewer system consists of a single drain system that collects both untreated sewage.

The net result of untreated sewage disposal and lack of sanitation infrastructure is endemic prevalence of infectious waterborne diseases. In addition, outbreak of cholera and typhoid fever epidemics is a frequent occurrence. Both the human and economic cost of water related sickness is therefore substantial. UNEP spot check testing of 50 urban and rural drinking water supply sources found wide spread (76 per cent) incidence of bacteriological contamination, including pathogenic microbes of fecal origin in nearly one third of samples tested. Other studies, for example, an environmental impact assessment of Tenke and Fungurme in Katanga Province, revealed widespread contamination by E. coli and total coliform bacteria in both groundwater and surface water.

While biological contamination represents a largescale risk to human health in the DRC, it is one that is readily reversible and can be remediated through investment in standard water and sanitation infrastructure. Nevertheless, it will not be possible to implement a centralized wastewater treatment system in most of the DRC due to the dispersal of the population in unplanned peri-urban areas and the inability of the general population to pay for such a service. Alternative options focusing on community-level wastewater systems need to be developed, including approaches based on ecological sanitation technologies as well as traditional septic tanks.

Sediment pollution

Suspended sediments represent an important and growing pollution load in many of the DRC's rivers. Despite high levels of natural turbidity (cloudiness), particularly in the mountainous east of the country, the problem has been considerably worsened by watershed degradation. Extensive land cover and land use changes have led to excessive rates of soil erosion within many catchments. Specifically, the principal activities responsible for elevated suspended solid concentrations include ad hoc agricultural expansion, informal settlements including refugee and displaced persons camps, deforestation and vegetation clearance and mining. As sediment particles may include dangerous bacteria, viruses, heavy metals and toxic organic compounds, water quality is not only aesthetically compromised by its murky appearance but also importantly carries a pollution risk to human health and aquatic life. High levels of suspended sediment pollution have caused considerable economic losses, particularly by disrupting the operation of water utilities and dams. A case in point is that of the Lukunga water treatment plant in Kinshasa, where there is a direct relationship between sediment contamination and the chemical cost of water treatment.Dam operations have also been hampered by siltation, including the country's most important hydropower plant at Inga and the Ruzizi dam in South Kivu. In Maniema, the Lutshurukuru dam's hydropower production capacity was reduced by increased sedimentation of its reservoir and offtake canal. Consequently, the SAKIMA mining company, which manages the dam, banned agricultural activity along the reservoir's edge and established a three kilometer buffer strip to protect it. While the government has made provisions restricting agricultural cultivation and other human development activities along riverbanks and lakeshores, these were observed to be rarely enforced in practice.

Conclusion and recommendation

The water sector is today on the brink of undergoing fundamental reforms driven by the Water Code and decentralization laws. High-level political commitment and donor support have also reinvigorated

the sector. To alleviate the prevailing water supply crisis, it is critical that planned reforms are carried out in a disciplined manner. While the decentralization of water institutions is an important guiding principle, it needs to be well planned and be both financially and technically realistic. For many provinces, this may not be feasible in the short to medium term. Capacity building strategies and programs to develop and improve existing technical and management skills at the provincial and local levels is a clear priority to avert the risk of a "governance vacuum". In addition, special measures may need to be taken to avoid potential regional inequities in water services and help facilitate institutional transition. While substantial funding mobilization is an encouraging development, large-scale infrastructure investments should not overshadow micro-level projects. Based on current experiences in the DRC, small-scale projects such as community-based water systems and low-cost solutions such as public standposts, spring boxes and hand pumps have the potential for reaching a larger beneficiary population and providing greater returns for the investment made. The critical next step is to promote and upscale these successful initiatives into large-scale national programs. A multipronged investment strategy that is based on a mixture of both macro and micro solutions is therefore needed. Given severe budgetary shortages, enabling conditions that provide incentives for the participation of private enterprises and social economy organizations need to be put in place to help mobilize much needed resources.

Securing substantial funding for the establishment of a comprehensive water observation network and information system is equally essential, particularly in light of the importance of water data in the development of key economic sectors. A major challenge is the informalization of water delivery services, which are not subject to adequate regulatory controls. As a result the construction quality and sustainability of water supply structures is seriously compromised, with important consequences for human health. Building the capacity of national authorities to ensure effective water sector coordination and independent oversight is therefore a priority issue. Humanitarian actors in the water sector also need to establish a robust mechanism to supervise and follow up on the quality of their interventions. Finally, the degradation of strategic drinking water sources from unplanned land use changes is a nationwide problem. Immediate steps to secure the land area surrounding drinking water sources should be taken as a first line of defence, and gradually expanded based on catchment management plans. In conclusion, given the abundance of the DRC's water resources, the aforementioned problems are fully surmountable provided that astute investments and governance reforms are effectively implemented.

Recommendations

There are three main themes for the proposed recommendations. These are: (i) support to water sector governance reform; (ii) technical and institutional capacity-building; and (iii) establishing the scientific information base to strengthen water resources management. A preliminary estimate of the investment package required for the water sector over the next five years – excluding major infrastructure projects – is evaluated to be in the range of $169 million. This indicative costing is derived from broad calculations based on similar projects underway in the DRC and/or other developing countries. The final price tag will need to be re-evaluated and refined during the project development phase in consultation with national partners. Implementation of the recommendations involves a wide range of actors

including government ministries and state owned corporations, development partners, UN agencies, the private sector, NGOs and social economy organizations. It should be noted that the bulk of the funds ($100 million) to implement the proposed recommendations is designated for small-scale infrastructure projects (namely autonomous, community-based water supply systems). The balance of $69 million to implement the other recommendations – focusing on strengthening water governance, data collection, capacity-building and innovative technological solutions – represents approximately 3.5 per cent of the overall $2 billion investment package required to achieve the DRC's MDG/PRSP water target.

There are ten key interventions that need to be implemented as a matter of priority. These are:

1. Develop a national water policy, sectoral water strategies and statutory regulations. Following the adoption by Parliament of the Water Code, elaborate a national water policy defining the guiding principles that would create the "enabling conditions" to mobilize investments and ensure strong incentives for improvements in water use. As envisioned in the Water Code, preparation of a water resources management strategy and national public water services strategy should be carried out as a matter of priority. Statutory regulations and guidelines to support the effective implementation of the draft Water Code need to be developed. Priority areas include water service provision (including construction guidelines), water quality standards, operating standards on the demarcation of water source protection zones, rules on monitoring drinking water quality and directives on water data collection and access. A follow-up training component for government officials and other stakeholders on the new water regulations would also be needed.

Preliminary cost estimate: $2 million

2. Develop a comprehensive national water information system for the DRC. This entails investment in both the "hardware" and "software" components of a water information system. The former refers to building a hydrological and climatological station observation network, which was to a large extent, destroyed during the conflict period. It would cover surface and groundwater and monitor both water quantity and water quality. The "software" component is concerned with stakeholder coordination, setting data standards and defining modalities for information sharing and dissemination. Finally, a "human ware" component would provide technical training in data collection and information management. This program should directly build on the work carried out by GTZ to establish a national water information system (SINIEau). Funding for setting up such a program would need to be mobilized from a consortium of international partners.

Preliminary cost estimate: $40 million

3. Invest in autonomous, community-based management of microscale water infrastructure. This should be largely based on the successful Water User Association (WUA) model developed by the BTC. A discernible advantage of microscale infrastructure projects is that they can provide greater returns on investment made and reach areas inaccessible to government services. By increasing water supply coverage in periurban and rural areas, WUAs would significantly contribute to the achievement of

national and MDG-based water targets. The key operating principle for WUAs would emphasize full cost recovery to ensure sustainable infrastructure operation and maintenance. The project would also explore ways of scaling up the activities of WUAs to improve watershed management and protection, and may include such activities as reforestation, gully rehabilitation and solid waste collection. At the same time, the importance of formalizing small-scale community projects by developing the appropriate regulations and ensuring adequate oversight cannot be overemphasized.

Preliminary cost estimate: $100 million

4. Implement a capacity-building program for decentralized water institutions. In view of decentralization plans, this program would primarily target building the capacities of provincial water authorities. It would entail significant investment in technical and administrative training in areas such as water law and strategies, development of institutional arrangements and equipment provision. Pilot provinces and catchments from different regions would be selected to ensure that they reflect the country's heterogeneous conditions.

Preliminary cost estimate: $15 million

5. Develop and implement watershed-based source protection plans. This program would target strategic but degraded watersheds that play a critical role in supplying drinking water to large population centers. Priority catchmentsinclude N'Djili and Lukunga in the capital city of Kinshasa. This would entail development of pilot projects based on an Integrated Water Resources Management (IWRM) approach that aim to create a structured process for reconciling the divergent needs of multiple stakeholders within target catchments. It would also provide an opportunity to practically test the IWRM approach promoted in the Water Code and help inform the design of regional and national IWRM program.

Preliminary cost estimate: $1 million

6. Strengthen national capacity to coordinate and regulate water supply interventions in rural and peri-urban areas. This project would be undertaken within the framework of the "Village et Ecole Assainis" national program. It would comprise of two key components: (i) strengthen the capacity of SNHR to coordinate stakeholders and supervise the construction quality of water supply structures and (ii) develop the capacity of health centers (Zone de Santé) to monitor drinking water quality.

Preliminary cost estimate: $2 million

7. Establish a field monitoring program to ensure application of drinking water standards by WASH actors in humanitarian rapid response. To ensure maximum return on investment and long-term sustainability of humanitarian interventions, it is imperative to set up a follow-up mechanism to supervise the construction standards and the drinking water quality provided by international agencies and NGOs in emergency situations, particularly in the war-torn eastern part of the country. In this regard, donors need to recognize the importance of dedicating resources for field verification, particularly in view of the protracted nature of emergency response in the DRC.

Preliminary cost estimate: $500,000

8. Design and implement renewable energy pilot projects for conventional water utilities and autonomous, community-based water supply systems. Fuel oil costs represent a major financial burden on conventional water treatment plants and community-run supply networks, particularly in geographically isolated areas of the DRC. This pilot program is divided into two phases: (i) carry out a technical assessment to identify appropriate renewable energy technologies (kinetic energy turbines, microhydro, solar, wind, biofuel) for operating conventional water treatment plants in secondary urban centers and community-level supply networks in peri-urban and rural areas and (ii) based on the technical evaluation, implement the simplest and most appropriate renewable energy solutions selected (in terms of efficiency, maintenance and cost) at three demonstration sites and disseminate and upscale the lessons learned.

Preliminary cost estimate: $5 Million

9. Design and implement Ecological Sanitation

(Ecosan) pilot projects in strategic urban microcatchments. Biological water contamination is the most serious and widespread form of water pollution in the DRC, evidenced by the high incidence of waterborne diseases. The aim of the ecosanitation pilot project is to control pathogenic fecal contamination and improve water quality in priority catchments supplying drinking water to major urban centers. The project will focus on adapting existing ecosan models (e.g., dry toilet systems) to the DRC's specific socio-economic context and prioritize their application in vital segments of water source catchments. As the successful promotion of the ecosan approach requires a change in sanitary culture, priority will be given to public sanitation services (e.g., marketplaces, schools, hospitals, government facilities). In addition, the feasibility of promoting a closed-loop approach and attributing an economic value to human excreta as a valuable source of agricultural nutrients that can help enhance urban food security will be examined. The best-practice ecosan models selected will subsequently be used for demonstration, training and upscaling.

Preliminary cost estimate: $1.5 Million

10. Design and implement pilot projects to introduce rainwater harvesting technologies at the household and community levels. This pilot program would undertake various trials to assess the potential for rainwater harvesting in the country's diverse regions. The objective is to identify effective rainwater collection techniques – for both rural and urban areas – to help meet domestic water consumption needs, including for irrigation of small household plots. The pilot project would also include training and awareness-raising components to showcase and disseminate information on the country's underutilized rainwater harvesting potential.

Preliminary cost estimate: $2 million