

GIARDINA, PRANDINI & SORLINI

35th WEDC International Conference, Loughborough, UK, 2011**THE FUTURE OF WATER, SANITATION AND HYGIENE:
INNOVATION, ADAPTATION AND ENGAGEMENT IN A CHANGING WORLD****Addressing school water, sanitation and hygiene
for the recovery phase in Haiti 2010***D. Giardina, F. Prandini & S. Sorlini, Italy***REFEREED PAPER 1191**

This paper examines the water, sanitation and hygiene situation in 42 schools in the West Department of Haiti, after the 12th January 2010 earthquake. The aim of the study is to provide an assessment of the water and sanitation facilities in the project schools, analyzing the different stakeholders involved, and to underline challenges and opportunities for project implementation during the recovery phase. Direct observations showed that schools lack safe drinking water, appropriate sanitation and hand washing facilities; likewise hygiene promotion is not included in the school curriculum. Semi-structured interviews with schools directors revealed that main constraints to improve the water, sanitation and hygiene services are related to lack of funding and infrastructures loss after the earthquake. Providing schools with water and sanitation facilities and supporting the implementation of hygiene promotion programmes, including a disaster risk reduction and preparedness plan, can play a significant role for a sustainable recovery phase.

Background information

After the earthquake devastated Haiti on 12th January 2010, schools have been struggling to start their normal activities which recommenced in April 2010. Prior to the earthquake 55% of Haitian primary school aged children did not attend school and the emergency worsened the situation. In the West Department, almost 85% of the kindergarten, primary and secondary schools, which were operational before the earthquake, had been damaged or destroyed (UNICEF, 2010). Furthermore, the majority of schools lack safe drinking water, sanitation and hand washing facilities; those which have such basic facilities do not invest in instruction for hygiene promotion and health education (Haiti Education Cluster, 2010).

According to the Inter-Agency Network for Education in Emergencies (INEE, 2010) - minimum standards for education, Standard 3 - the provision of basic services in schools is a children right and safe learning spaces should have:

- adequate sanitary facilities, taking account of age, gender and including access for persons with disabilities;
- access to adequate quantities of safe drinking water and water for personal hygiene;
- basic health and hygiene promotion in the learning environment.

The basic services mentioned above are included in the broader SPHERE (Humanitarian Charter and minimum standards in disaster response) currently under revision (SPHERE, 2004).

Moreover, in light of many schools not meeting the above services provision, since October 2010 schools are facing major challenges from the threat of cholera which is spreading throughout the Country. Cholera caused, until February 2011, 4,131 deaths and 215,936 hospitalised; a marginal decrease in cases is reported but treatment services should continue to be accessible to people and communication activities should carry on (OCHA, 2011). Available information indicates that the large numbers of cases are of school-age population with a very high mortality rate, stressing an urgent need to launch prevention activities to

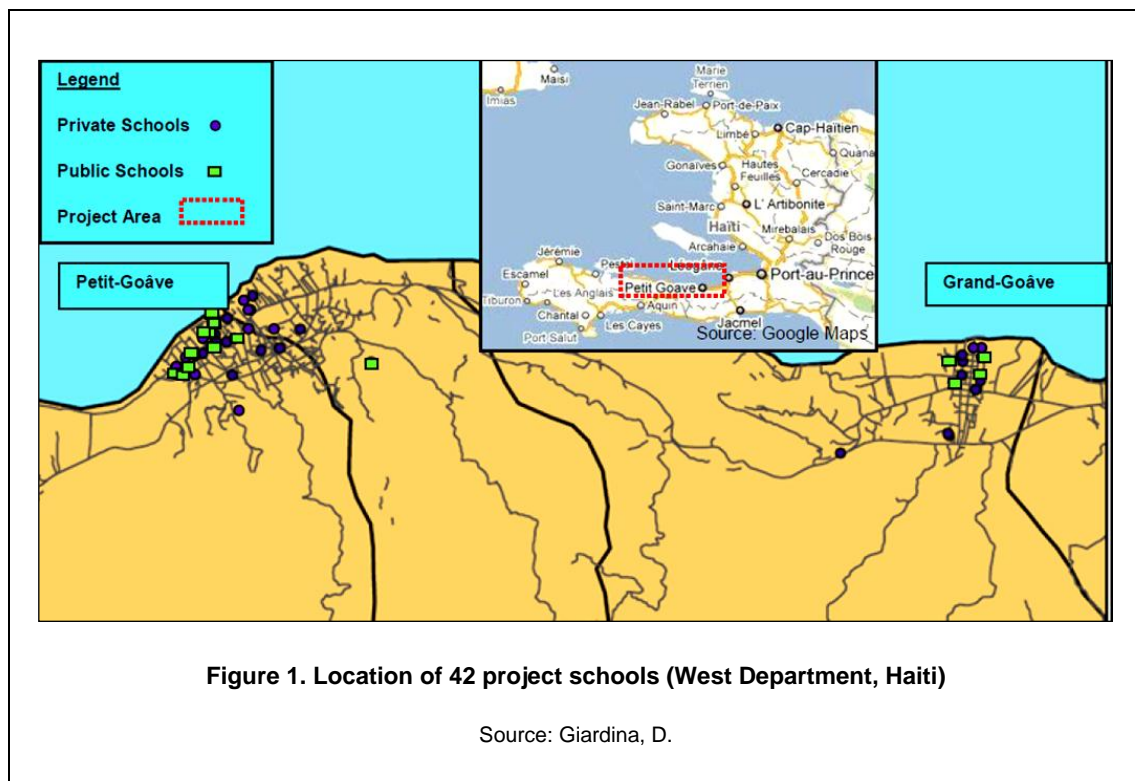
improve the hygiene knowledge of pupils and to speed up as well the implementation of hardware activities (water and sanitation facilities).

An Italian NGO, Cooperation and Development (CESVI) is implementing a water, sanitation and hygiene project in schools, funded by UNICEF (United Nations Children's Fund), ECHO (Humanitarian Aid department of the European Commission) and AGIRE (Italian Agency for Emergency Response).

The main aim of the project is to create a safe and healthy learning environment for children in 42 schools, 29 in Petit-Goâve and 13 in Grand-Goâve, situated in the West Department, the most affected by the earthquake, and it will continue during 2011 (Figure 1). Main activities of CESVI project are:

- to build latrines with lockable door for each cubicle and, where space allows, urinals. All measures will be taken to provide at least one accessible latrine for children with disabilities. Latrines and urinals will be segregated by gender. Separated latrines for teachers will be provided;
- to put in place rainwater harvesting systems and, where possible, connections to the water supply network;
- to put in place hand washing facilities with self release taps in the near proximity of latrines and urinals;
- to carry out hygiene promotion campaigns in all project schools.

CeTAmb, an Italian research centre on appropriate technologies for environmental management in developing countries, based at the Faculty of Engineering at the University of Brescia, carried out a baseline water, sanitation and hygiene assessment for CESVI project and the main findings are reported in this paper.



Objectives and methodology

A field study was carried out between 30th October 2010 and 3rd December 2010. The study entails the survey of the 42 project schools (see Figure 1), located in the West Department in Petit-Goâve and Grand-Goâve. The objectives of the study are:

- to investigate access to school education highlighting the main differences between private and public schools;
- to provide an assessment of the water and sanitation facilities in the project schools;

- to analyze the different stakeholders involved and develop a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis of primary stakeholders;
- to underline challenges and suggest actions for the project implementation.

Several methods for data collection have been used, both quantitative and rapid appraisal:

- **an infrastructural survey** was carried out in the 42 project schools in order to evaluate what type of water and sanitation facilities were present in the schools and their condition;
- **direct observations** and discussions with the children were conducted at the project schools. The observation allowed to see and inspect school latrines state, solid waste dumps and drinking water supply used at school level;
- **key informants semi-structured interviews:** school directors and teachers have been interviewed through semi-structured interviews. School directors have been asked to highlight major challenges related to the water and sanitation infrastructures of their schools. School teachers have been asked to report children behaviours towards sanitation and hygiene, as well as their involvement in hygiene training;
- **a SWOT analysis** was developed for primary stakeholders to identify the key internal (strengths and weaknesses) and external factors (opportunities and threats) that are important in project implementation;
- **relevant literature review:** all data collected at field level were revised using relevant literature on WASH in schools (WHO, 2009; UNICEF and IRC, 1998) and the available support data, reports and guidelines from the Education Cluster and the WASH cluster in Haiti.

Findings and discussion

Access to school education

From the survey, it emerged that out of the 42 project schools in Petit-Goâve and Grand-Goâve, 67% are private and 33% are public. This trend is respected in the whole Haiti, where the vast majority of schools are private, in the absence of a well developed and functioning system of public schools (Salmi, 2000). Private-run schools have been largely operating without regulation and below minimum standards. 60% of public school fees are transferred to the Ministry of Education, the rest is used for operational cost of the establishment. Some public schools have increased the yearly fee in order to be able to pay teachers and professors, which are not nominated by the public system, but are necessary in order to run the teaching activities in the school. Private schools can ask fees that have a huge variation, based also on school level (kindergartens less than secondary schools). According to the average income in Haiti, which is 653.7 USD/per capita/year (UNDATA, 2008), and to the data collected, school fees can have a weight on the yearly average per capita income, varying from 0.4% for public schools (2.48 USD) arriving as high as 57% for private schools (372.67 USD), as shown in Table 1.

Schools type	Number of project schools n= 42 (%)	Average number of children per teacher	Yearly school fees (HTG)	Yearly school fees (USD)	% on yearly average income
Public	14 (67)	54	100-500	2.48- 12.42	0.4-2
Private	28 (33)	20	1000-15000	24.84- 372.67	4-57

After the recent earthquake, a high number of children were injured, many of them with lasting physical disabilities. According to the Ministry of Social Affairs and Labour, there are only 23 schools in the whole Country that accept physically disabled persons and that have adapted facilities (MAST, 2011). This highlights a gap in school education reaching disabled and, moreover, draws attention to the need for schools to incorporate facilities adapted to local needs of the population.

Additional findings show that many schools were used to host displaced people in the earthquake aftermath, causing delays in the restart of normal educational activities and overloading existing facilities.

Assessment on water, sanitation and hygiene

The National Direction of Potable Water and Sanitation (DINEPA), the Ministry of National Education (MEN) and UNICEF developed minimum standards on water and sanitation for schools (DINEPA, 2010), that are extracted and summarized in Table 2.

Sanitation	Water quantity/quality	Products that have to be available for each school
1 latrine/every 30 girls 1 latrine/every 60 boys 1 latrine/every 20 employees Minimum 3 latrines in case of low number of inscriptions	1-1.5 l drinking water/pupil/day 1.5-2 l for hand washing/pupil/day 2-8 l for latrine cleaning/cabin/day Water quality (0-10 CFU/100 ml)	Disinfectant products Soap Toilet paper 1 dust bin per class Hand washing near latrines

Schools in the project area do not respect the above mentioned standards. The ones that have been completely destroyed by the earthquake have not re-built their buildings yet: 14 schools of the 42 are having classes in semi-permanent hangars that have been placed and no sanitation facilities are in place. During the mission, a water and sanitation infrastructural survey has been carried out and it is reported in Table 3.

Type of service	Type of facilities	Project schools n=42 (%)	Petit-Goâve n=29 (%)	Grand-Goâve n=13 (%)
Sanitation facilities	Pit latrines/urinals	25 (60)	17 (59)	8 (62)
	WC + septic tank	3 (7)	3 (10)	-
	Nothing	14 (33)	9 (31)	5 (38)
Hand washing facilities	At the hand pump	8 (19)	2 (7)	6 (46)
	Tap stands	10 (24)	9 (31)	1 (8)
	With buckets	6 (14)	2 (7)	4 (31)
	Nothing	18 (43)	16 (55)	2 (15)
Water supply	Water supply network	10 (24)	9 (31)	1(8)
	Borehole	8 (19)	2 (7)	6 (46)
	Nothing/private vendors	24 (57)	18 (62)	6 (46)
Solid Waste Management	Open burning	24 (57)	16 (55)	8 (62)
	Buried	4 (10)	2 (7)	2 (15)
	Dumped	14 (33)	10 (34)	4 (31)

Schools that have sanitation facilities have mostly simple unlined pits of about 3 m deep, with no water. Average number of pit latrines per school was 2, with often no segregation between girls and boys and the environment around the latrines was dirty ill maintained. Out of the 42 schools surveyed, there were no latrines for disabled persons and no disabled students enrolled. Through focus group discussions with pupils, there was an indication that many school children do not use the latrines and prefer to do their needs around the outside; when asked why, respondents complained that latrines were too dirty, smelly, with inadequate lighting, not private enough and often without doors. Interviews with teachers confirmed these findings and

furthermore observations around the vicinity of the latrines showed signs of open defecation. Where septic tanks were presents (only 3 schools) desludging machinery was not always accessible. Materials for anal cleansing were not available in any of the surveyed schools. Where sanitation facilities do not exist at all, children practiced open defecation or used neighbour latrines. Where water connection was not available onsite, hand washing facilities consisted of buckets with taps or directly at the hand pump (as reported in Table 3). Despite the fact that washing at the hand pump at the school had good accessibility, there was no water available at the latrine entrance/exit, hence hand washing might not be done at the critical times contributing to disease spreading. Out of 42 surveyed schools, only 25% had soap available, while for the rest, either they did not have at all hand washing facilities (almost half of the project schools) or soap was not present at the observational survey.

As reported in Table 3, out of 42 schools surveyed only 8 schools had private access to water supply facilities. There were two main types of water supply facilities found; these included 8 shallow boreholes (2 in Petit-Goâve and 6 in Grand-Goâve), equipped with India Mark II hand pumps (15-35m in depth), and 10 water tap stands (8 in Petit-Goâve and 2 in Grand-Goâve) connected to gravity fed systems supplied by protected sources. Although the water quality of the boreholes was not tested, the risk of microbiological contamination was presumed high due to the unsuitable distance of onsite sanitation facilities and in relation to the shallow groundwater depth. Furthermore, the water quality at the tap stands in Petit-Goâve, though also not tested, was presumed to be a high risk from microbiological contamination due to leakages, illegal connections and disruption of part of the system, causing low pipe pressure and infiltration. Some schools reported point of use treatment with chlorine tablets (7 in Petit-Goâve and 2 in Grand-Goâve). In the schools where no water supply is available, children buy treated water at kiosks in small sachets or bottled water: as a consequence of the high cost, water is not accessible to each child every day.

No appropriate equipments and facilities are available for the collection and transportation of solid waste, resulting in a not clean environment. Solid waste practices involve either the open burning every week - 57% of the project schools - or just a dump next to the school buildings or latrines, as reported by directors. 10% of the project schools have an unlined refuse pit, consequently shallow water resources are not protected. Class dustbins are available only in 12% of the project schools.

Hygiene education is not taught at school level, also since school children in a class are too numerous (with peaks of 70 pupils) and teachers are not enough (Table 2). Moreover, some teachers declared, during the interviews, that although they might teach some basic hygienic behaviours, if facilities are not present in the schools, they are not likely to be retained and done at home.

Stakeholders and SWOT analysis

The identified stakeholder groups have been divided into three categories:

- **primary stakeholders:** this is the category of stakeholders who are directly affected by the action and who can also be referred to as the direct beneficiaries of the project. The involvement, participation and contribution of the primary stakeholders in the planning and implementation of the project activities is principal, especially for the purposes of ownership and sustainability. They are students and teachers of the targeted schools, along with their families. Additionally, this category includes the directors of the same schools and the two local inspectors of the primary and secondary level. The semi-structured interviews with the directors highlighted that major loss in terms of school materials such as blackboards, books and desks have occurred with the earthquake and some of the existing water and sanitation facilities have been destroyed or damaged (32 out of the 42 project schools). Moreover, they reported that school budget is not enough to construct and maintain water and sanitation facilities. Paying for a water connection bill, a cleaner and a desludging truck, among other operational costs, goes far beyond the yearly school budget. This was reported by private schools as well. Directors reported that public schools have not enough teachers and professors to fulfil the need of scholars, that is the reason why, as mentioned before, hygiene training is not included in the normal curriculum and it is a personal choice of professors to dedicate some time per week during their normal teaching activities;
- **secondary stakeholders:** this category is includes the implementing and institutional partners, such as municipality members and civil protection units, which can effectively contribute to the project implementation. Ministry of National Education and Vocational Training (MENFP) is a key stakeholder that can support in creating an enabling environment for schools to pursue their mission;
- **key stakeholders** are donors, particularly UNICEF, and other agencies that can contribute supporting the MENFP in terms of policies and implementing projects.

A SWOT analysis has been carried out in order to highlight the challenges and opportunities of the primary stakeholders for the implementation of the project and it is reported in Table 4.

Table 4. SWOT Analysis of primary stakeholders				
Primary stakeholders	Strengths	Weaknesses	Opportunities	Threats
School personnel	<ul style="list-style-type: none"> • School directors and teachers are committed to improve the school environment. • Commitment in educating and supporting children. 	<ul style="list-style-type: none"> • Facing post disaster trauma. • Not paid during emergency phase up to April 2010. • Not enough budget for public schools to pay all teachers. • No specific training on hygiene issues. • No maintenance of sanitary facilities. 	<ul style="list-style-type: none"> • The authorization of inspectors is needed in order to successful implement project. • The involvement of school personnel will support in giving continuity to the project. • Reaching a considerable number of children with hygiene campaigns. 	<ul style="list-style-type: none"> • Changes in administration and leadership could cause confusion in terms of roles and responsibilities. • Lack of salaries payment could cause teachers drop out. • Concerns about possible increased work-load. • Cholera outbreak is threatening the whole country, being children the highest at risk. • In case of natural disasters: schools could close and become again hosting places for displaced people.
School students	<ul style="list-style-type: none"> • -Link with their households and their fellow colleagues for learning activities. 	<ul style="list-style-type: none"> • Facing post disaster trauma. • School closed from 13th January until April 2010. • Lower number of students inscription due to relocation or other earthquake effects. • High rate of absenteeism due to difficulties in paying schools fees and uniforms. 	<ul style="list-style-type: none"> • Contribute to the design and maintenance of school facilities. • Contribute to the sanitary facilities development of the community where the school is located. • Cholera sensitization could reach more children than conventional hygiene programmes. 	
Community	<ul style="list-style-type: none"> • Recognize the value of the institution. • Periodic parents meeting (not in all project schools). 	<ul style="list-style-type: none"> • Facing post disaster trauma. • Not much community involvement. 	<ul style="list-style-type: none"> • Replication factors. • Students as "agent of change". 	

Moreover, the success of implementing a sustainable programme is strongly linked to an active participation of all stakeholders, including secondary stakeholders and donors. A regular monitoring and evaluation will allow identifying the factors that need to be strengthened or modified to ensure a positive impact of the project.

Recommendations

Schools in Haiti were in a precarious state - without meeting international standards in terms of appropriate water and sanitation facilities and use - even before the 12th January 2010 earthquake, that worsened the situation. As mentioned, 32 schools out of the 42 of the project had their facilities destroyed or damaged by the earthquake. Since Haiti is threatened by several types of natural disasters (hurricanes, flooding, earthquakes, etc.), a disaster risk reduction and preparedness plan should be developed for the schools, in order to be able to support the displaced people that seek shelters after the disaster. A contingency stock should be included also into the school water and sanitation plan and additional facilities should be available in order to avoid overloading and sustain as well the restart of school activities.

Currently, with the cholera outbreak, further attention should be posed to the drinking water quality and to its safe storage and consumption. Fear about the cholera spreading disease started to introduce a new perception about the importance of hygiene. Protecting children against cholera may not only decrease the burden in this age group, but decrease transmission of the disease to their family members and the community (Deen, 2008). Specific materials for training and key messages for hygienic practices should be developed.

Several suggestions on how to improve the current project have been proposed as following:

1. Sanitation and hygiene promotion:

- a Knowledge, Aptitudes and Practices questionnaire has been locally developed and is being used in order to get baseline survey for school children and professors, and to better address the key messages of hygiene promotion;
- a different approach could be used and/or trialled for schools in the rural sections of Petit-Goâve and Grand-Goâve such as the Community Led Total Sanitation that have been proven to be successful also for schools in Nepal (Bell, 2010);
- at least one latrine per school should be accessible to disabled children, that are even more after the earthquake. This will also attract disabled children to enrol in schools;
- onsite sanitation technology designs - ventilated simple pit latrines and urinals - have been adapted, standardized and approved by the MEN (Ministry of National Education) and DINEPA (National Direction of Potable Water and Sanitation). Other technologies (i.e. double vaults de-hydration latrines) in order to prevent shallow water contamination could be explored as pilot project;
- school budget is not enough to invest in the constructions of the facilities and might be not enough also to maintain them: an operation and maintenance action plan has to be developed together with school directors and teachers to improve management of sanitation facilities;
- it is essential to have separate toilet facilities for girls and boys. Lack of separate and safe sanitary facilities can be a factor to discourage girls to go to schools and contribute to their drop out, especially of adolescents. Growing girls find it difficult to attend schools that have no or few badly maintained facilities;
- where sanitation infrastructures are connected to water supply, a way to treat or recover wastewater and sludge could be studied;
- no treatment facilities are available for sludge disposal in the region. A major concern is land ownership and difficulty for the Municipality to find an appropriate space. Several NGOs started to advocate to the Municipality to identify such areas (also for solid waste), but to date, no land has been found available and suitable for the purpose.

2. Access to safe and enough water:

- rainwater harvesting is a low cost solution that could be studied and applied in this area. Yearly rainfall in the Department has a range that varies between 1,200-2,700 mm/year and two rainy seasons March-June and August-October (US Army, 1999);
- providing the connection to the water supply network might pose future challenges to the sustainability of the system: school budgets have to be clearly analyzed in order to allow an allocation of a water monthly fee. Moreover, water from the water supply system is presumed to have not a suitable quality for direct drinking purposes, since at risk of contamination. A point of use treatment with chlorine tablets or sand filters might be suggested and school personnel trained on their use.

3. Solid Waste Management:

- refuse pits for organic compostable materials could be constructed to diminish the fraction that needs to be disposed. The compost process can be capitalized on as learning activity for students;
- in order to increase the school budget, separate collection of plastic bottles, cans and glass bottles could be suggested to be done. Then the collected materials can be sold to enterprises that are managing the recycling in Port-au-Prince. Further market analysis should be developed to evaluate its feasibility.

Conclusions

The research underlines the importance of targeting schools after natural disasters and which interventions can have a greater impact. There is a need to develop a strategy that links emergency needs to durable and sustainable recovery phase. After a disaster, schools should be able to accommodate displaced people and, at the same time, provide a safe learning space for children. This can be achieved developing a disaster risk reduction and preparedness plan. Moreover, schools have an important role, as institutional vehicle, to reach younger generation and stimulate hygiene and sanitation practices which are sustained beyond the period of an intervention (IRC, 2006). However, investments alone in the provision of water and sanitation facilities have been unsustainable; this underlines the cost effectiveness of integrating software components, such as hygiene programmes, in order to have a long-term positive impact on school children health and on their households.

Acknowledgements

The authors would like to extend thanks to CESVI organization that supported the field work in Petit-Goâve and Grand-Goâve, West Department, Haiti.

References

- Bell, B. (2010) *Analysis of school-led total sanitation in Chitwan, Nepal*. UN-HABITAT Nepal. Utrecht University. Faculty of Geosciences. MSc in Sustainable Development.
- Deen, J.L., Von Seidlin, L., Sur, D. (2008) *The High Burden of Cholera in Children: Comparison of Incidence from Endemic Areas in Asia and Africa*. PLoS Neglected Tropical Diseases Vol. 2 No 2.
- DINEPA (2010) Draft, *Note d'orientation sur l'eau et l'assainissement dans les établissements scolaires*. Direction Nationale de l'Eau Potable et de l'Assainissement. Port-au-Prince.
- Haiti Education Cluster (2010) *Cholera response strategy*. November 2010. Port-au-Prince.
- INEE (2004) *Minimum Standards for Education in Emergencies, Chronic Crises and Early Reconstruction*. Inter-Agency Network for Education in Emergencies.
- IRC (2006) *School sanitation and hygiene education results from the assessment of a 6-country pilot project*. UNICEF United Nations Children's Fund and IRC International Water and Sanitation Centre. Netherlands.
- MAST (2011) *Pour une Scolarisation massive des personnes handicapées*. Ministère des affaires sociales et du travail, Bureau du Secrétaire d'Etat à l'intégration des personnes handicapées. Port-au-Prince.
- OCHA (2011) *Haiti Cholera Situation Report #35*, 04 February 2011. Port-au-Prince.
- Salmi, J. (2000) *Equity and Quality in Private Education: the Haitian paradox*. Compare Vol. 30, No 2.
- SPHERE (2004) *Humanitarian Charter and minimum standards in disaster response*. Oxfam Publishing: Oxford.
- UNDATA (2008) *Haiti Country Profile*. [Online] Available at: <http://data.un.org/CountryProfile.aspx?crName=Haiti> [Accessed February 2011].
- UNICEF and IRC (1998) *Towards Better Programming: A Manual on School Sanitation and Hygiene*. Section Water, Environment and Sanitation Technical Guidelines Series/UNICEF no. 5. Programme Division Water, Environment and Sanitation: New-York.
- UNICEF (2010) *Unicef Haiti Situation Report. Children of Haiti three months after the earthquake. Progress, Gaps and Plans in Humanitarian Action Supporting a Transformative Agenda for Children*. United Nations Children's Fund. April 2010.
- WHO (2009) *Water, sanitation and hygiene standards for schools in low-cost settings*. World Health Organization. Edited by John Adams, Jamie Bartram, Yves Chartier, Jackie Sims. WHO press: Geneva.
- US Army(1999) *Water Resources Assessment of Haiti*. US Army Corps of Engineers Mobile District and Topographic Engineering Center.

Notes

Daniela Giardina is PhD trainee in "Appropriate Methods and Techniques for International Development Cooperation" of the University of Brescia, supported by the Alberto Archetti Fund.

Contact details

Daniela Giardina, Fausta Prandini & Sabrina Sorlini
CeTamb - *Research Center on Appropriate Technologies for Environmental Management in Developing Countries*. Department of Civil Engineering, Architecture, Territory and Environment.
Via Branze 43, Postal Code 25123, University of Brescia (BS), Italy. Phone: +390303711302
Email: giardina.daniela@gmail.com fausta.prandini@ing.unibs.it sabrina.sorlini@ing.unibs.it
Web: http://www.ing.unibs.it/~cetamb/Eng/Home_eng.html
