

WASH and DRR integration during a flood response in Cordoba province, Colombia

A case study

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Introduction

The Northern department of Córdoba, one of the areas most affected by poverty and emergency in Colombia, has suffered several major flooding events in recent memory. On 11 July 2007, the Directorate for Disaster Preparedness and Management declared a state of public calamity for 13 of the 28 municipalities in the department, after the first of two rainy seasons caused widespread flooding when the San Jorge and Sinu river levels rose significantly. Over 14,000 families from 19 municipalities in the department of Córdoba were affected.

Colombia is particularly exposed to the effects of climate change, with unpredictable weather events occurring frequently in recent years. In particular the rainy season has become more intense, leading to increased frequency and intensity of flooding. This is due in part to the occurrence of the “*La Niña*” phenomenon which has led to heavy rains and potential flooding and landslides in the Caribbean and Andean regions of Colombia over the past year. In addition, the Rio Sinu hydroelectric project was completed in 2007. In 2010 the dam reached its highest capacity and due to having to release the pressure, flooding took place in surrounding areas. Locally, changes in land use as the region develops could also be a factor. Landowners draining swamp lands and building “*camiones*” (retention walls) to allow for cattle grazing, reduces important infiltration and stormwater retention zones.

While access to water and sanitation in Colombia in urban areas is good by most standards, in rural areas coverage is less favorable: by 2002, in rural areas water supply coverage was at 71% and sanitation coverage



Figure 1: Map of Córdoba Province

was at 54%. Across the country, sanitation remains poor in areas where flooding occurs and cases of acute diarrhoea, respiratory infections, dengue and malaria are rising.

When the flooding in Córdoba occurred in 2007, access to water and drainpipe systems which were already in a poor state, became critically damaged. Many traditional water sources such as wells and tanks for rainwater storage were destroyed, and many people would access water from unprotected sources such as lagoons or rivers. Furthermore, both in rural and urban areas flooding has led to the overflow of septic tanks and the subsequent breakdown of latrines.

1. Poverty is widespread in Córdoba, where it affects 60 per cent of the population and is particularly severe in the remote rural areas and in conflict zones (Rural poverty portal : <http://www.ruralpovertyportal.org/web/guest/country/home/tags/colombia>).
2. Figures from SNSPD from Córdoba.
3. World Bank, 2006 « **Local Solutions Improve Water Supply and Sanitation in Colombia** ». siteresources.worldbank.org/INTWSS/Resources/colombia.pdf.

Oxfam Action

Oxfam in Colombia had been developing since 2004 a common strategy with the Colombian Red Cross (CRC) to increase local capacities in order to respond to natural disasters. Oxfam's aim in Cordoba is to incorporate adaptation and disaster risk reduction (DRR) in all programming, which currently includes programmes in (in addition to the in emergency in response to the December 2010 floods) food security and livelihoods and water, sanitation and hygiene (WASH).

Shortly after the flooding took place in 2007 Oxfam undertook discussions with local partners, CRC and local NGO ASPROCIG, and with funds from CERF and ECHO implemented projects to provide immediate needs for displaced, but in the longer term, integrating special measures for DRR. The aims were to assist vulnerable populations who experience frequent flooding to improve not only their WASH facilities but also change their practices in relation to public health in anticipation of future flooding events in 4 highly affected districts: Lorica, Momil, Purísima, and San Bernardo del Viento. More specific activities included the following:

Project Activities:

A. Improvement & Rehabilitation of community and household WASH facilities

The rehabilitation of 5 water supply systems took place benefiting close to 20,000 people. Depending on the situation, the system included improving water storage, pumping, water quality (through providing a multi-phase filtration system, testing and adding aluminum sulphate), raising the tank level above flood level and to improve contamination and the network distribution system. Households were also provided with 100 and 24 liter buckets to allow for safe storage. Water systems were adapted to flooding as the source intake was



Water system in El Playon for first stage filtration.
Photo credit: Oxfam.

raised and protected above the normal flood level, and special care was taken to protect the pump house and generator from flooding through locating on a raised platform.

A strong element of community participation was integrated in the water system construction, either through community members contributing to the construction, but also in training to oversee its long term use.

A training of 30 caretakers was undertaken at SENA (the National Learning Service). The one year training included the community members, many of them were the original water system operators who previously had no training on aspects of O&M of the water system. Afterwards, the participants received an accreditation. Participants were also trained on how to form the "junta de agua" in each village, and how to administer and collect funds.

B. Household Water Treatment

The project also targeted distribution of 1200 candle filters (imported from Brazil) with plastic 20L covered buckets with tap to affected households. This filter had been tested and shown to eliminate 98% of the bacteria which cause gastro-intestinal diseases caused by contaminated water. Each family received the filter was also given one kilo of type B aluminum sulphate to carry out the initial purification process in order to increase the filter's life.

In terms of acceptability, people needed intensive sensitisation on how to use the filters, as they were a new technology to the area. Six local promoters were trained in the use of water filters, to not only carry out the sensitization but also to monitor the effectiveness on reducing disease burden.

One of the main problems was that a large number of filters were broken in transit, and could not be replaced as replacement candles were not available considering that they were not available in country. The cost further inhibited replacement, as 2 candles needed cost \$16.

In the response to floods in the next year, in 2008, a bucket style filter of clay with colloid silver was distributed to communities in Cordoba. In future monitoring people found that these filters lasted longer. Oxfam helped to develop the filter with the company which was based in a western region of Colombia, Ocaña (North Santander). Although several were broken in transport, the filters were more easily replaced. Acceptance was also much higher for this style of filter, due to taste acceptability, although costs were high at \$25/filter.

Further flood affected families who did not receive filters received a bottle of household chlorine (450 families) for at least 2 months.



*A household filter distributed in Las Canas
Photo credit: Oxfam.*

C. School latrine units and household sanitation

Sanitation, being relatively difficult to manage in a dispersed situation, was implemented based on a prioritization strategy which included building of sanitation blocks in schools, and in targeted households afterwards. Patterns showed that with floods occurring each year, and in terms of location varying from which communities are hit, schools are typically used as temporary evacuation shelters. In some cases, where prolonged displacement was experienced, evacuation shelters were built on higher grounds, in close proximity to schools.

In 6 schools Oxfam provided flushing raised septic tank toilets supplied from a manually filled raised tank connected to the community water system. The toilets which were segregated by sex and especially designed for children, were provided in sufficient numbers (including urinals for boys) alongside basins with taps for hand washing. The sanitation blocks were formally handed over to the school, which would decide how to maintain them. In some schools an environment club was started with school children supervised by teachers, who do cleaning of toilets and promote proper waste management and recycling. In others, parents take turn cleaning, or the older students (boys and girls) will do the cleaning as part of social service. Teachers, parents and students were also trained on how to start a school club to clean and maintain the toilets, conduct hygiene promotion including waste disposal, and how to do minor repairs of the toilets. The locations for these facilities were chosen so that they would not be flooded during the rainy season, to ensure their continuous use during these times.

D. Hygiene promotion

All of the hygiene promotion activities were targeted specifically with public health and flood messages, and were designed keeping in mind the longer term knowledge needed, particularly promoting responsibility for the management

and maintenance of facilities since many people targeted were not living in camps. In an end monitoring report, it was found that a total of 650 families had received information about adequate hygiene practices, of which 70% have implemented such practices with their families according to key hygiene risks of public health importance identified.

Hygiene messages targeted by the Project:

Water treatment: Using participative methods, the population is taught to dispense type B aluminium sulphate to purify water in conjunction with water filters.

Signs of alarm - Preparation of O.R.S: The purpose of these is for people to identify the signs of alarm when children have diarrhoea and put factors into practice. In addition, people are taught to prepare ORS in the home.

Hygiene in the Home - Washing Hands: To motivate the population to improve hygienic conditions in the home and washing hands, raising awareness of the positive impact this has on health. In the schools and with the children, the importance of keeping the school's sanitary units clean and in good condition. Management and maintenance of Water filters. The community was trained in the use, maintenance and management of water.

A total of 15 volunteers were trained by CRC (4 water and 11 hygiene promoters), and used different approaches for adults (focus on demonstration of water filtration) and children (including the use of mimes), however in later years participatory approaches were found to be more successful such as including asking questions as a group and identifying joint solutions.

The project also included the Defensa Civil in its hygiene promotion activities, which is a volunteer disaster preparedness and response group that operates under the local government, in hygiene promotion activities. Volunteers were trained on communicating messages on hygiene messages and awareness when visiting communities.

E. Disaster Risk Reduction

In addition to direct support to affected households, Oxfam also undertook capacity building of local government and community leaders to develop their preparedness and coordination skills, as well as their management tools, so that they could respond effectively to disasters in the future. This included training and capacity building of CLOPAD (Local Committee for Prevention and Attention to Disasters), which is the most local government body tasked with coordinating emergency response, as well as Colombian Red Cross and key people in the areas of intervention.

Through the project, support was provided to develop a PLEC (Plan Local de Emergencia y Contingencia), as well as forming disaster committees. In the PLEC, groups identified risks and vulnerability at a contingency workshop with all local stakeholders. Activities at the national level included organizing a workshop on the National Prevention and Management of Disasters System with SNPAD (the National Committee for Prevention of Disasters) with national level stakeholders.

Key Outcomes

The project areas of Lorica, Momil, Purissima and San Bernardo del Viento were hit by flooding in subsequent years. Notably, at the end of 2010, the rainy season affected over 2.3 million persons in Colombia, with over 170,000 of those in Córdoba. Many of the original implementation districts were hit by even more severe floods, and households were instructed to remain in their homes, while few people sought shelter in nearby schools. Therefore, subsequent intervention had taken place and Oxfam's continued collaboration with ASPROCIG, CRC and local government, particularly CLOPAD, has led to further testing of project interventions and further lessons learned:

Raising institutional awareness

Interaction between Oxfam and partners with the local government demonstrated the need for provision of safe water and sanitation during flooding. According to ASPROCIG, showing water tests to the Secretaria de Salud before and after the use of water filters demonstrated the effectiveness of the filters in reducing contamination as well as the need for water treatment in the first place, as water tests showed a high level of contamination before use of filters. Because of the capacity building received through the project, the Defensa Civil was in stronger position to advocate for resources to CLOPAD and the Mayor on community based mitigation measures and the need for WASH improvement. Although awareness has been raised however, many stakeholders felt that there needed to be a continuous coordination process as there is no regular mechanism to further initiatives in between times of crisis, or to integrate lessons learned after each years flooding. It was also felt there was a need for better information flow between the local and regional (as well as national) level, between CLOPADs and CREPADs, to look at best practices in other areas and to stronger develop response capacity.

Household Water Quality and Hygiene Improvement

The outputs from the project for water quality, as well as use and acceptability of the filters was notable. In terms of quality, samples in 12 households were microbiologically analyzed, before and after filtration. The samples found that the filters effectively removed fecal bacteria in 100% of the 11 cases and one sample where only 90% of the fecal bacteria was removed. For use, in a filter monitoring report, 90% (of a survey of 100 users) were still using the filters one year after the intervention.

Intensive training and demonstration was referred to as a main reason for this. Due to the level of poor quality of water before the intervention and that the water filters were in fact being used, an improvement in health in some situations can be inferred.

Some problems encountered included the length of time it took to filter the water, and in some cases the filters were clogged easily.

However, families were reliant on the full subsidy and commented that they would not replace the filters (either due to cost but also availability through local shops), thereby showing that long term sustainability – and continued use in future emergencies – is completely reliant on future distribution should filters break or become not useable. The cost is also a factor as the filters reached 20% of the affected in the 4 districts – in the future targeted distribution of most vulnerable (most perennially flooded) is key for maximum impact. As subsidized distribution tends to undermine market distribution this would need to be considered in any future development related filter programme.

Promoting chlorine, which is readily available locally, as an alternative solution has also proved to be effective. In the village of Caoa Grande in San Bernardo del Viento, people now purchase

In an evaluation of 100 families one year after the filter project, it was found that 90% were still using the filters. Families were using the filtered water for general consumption, food preparation and the majority cleaned the filter weekly. The source water before filtration included aquaduct (54%), well (31%) and river (15%).

An Oxfam project report

locally available chlorine to add to drinking water which they learned to use from Oxfam training. As a householder who was not aware of chlorine use in water and was participant in Oxfam's hygiene promotion put it: "we now tell our neighbors about chlorine. Before we took water from the river, let it settle and then drank it, the Oxfam project has been great, we learned a lot and now we teach others and we help each other to understand".

Improved knowledge of adequate hygiene, particularly during flooding, and how to ensure safe water and sanitation during times of emergency is a lasting result of the project as people are able to target risky practice and avoid them in the future. In terms of hygiene practices, in a sample of 131 families, at the beginning of project 46% used these practices and after the project, 70.4%, which indicates a very important improvement on their understanding about good hygiene practices.

5. CREPAD is the Regional Committee for Prevention of Disasters in Colombia

Improvement of Household water supply:

In the village of El Playon in Lorica, water was collected from the nearby Sinu river in large containers. However with the construction of the water system and piped water supply, many benefits were introduced, particularly for women who typically would undertake water collection. Reduced time to collect water and ability to spend time on other productive tasks were seen as major positive outputs of the project.

The piped water also proved to be reliable in the future flooding events, including in December 2010. People would further treat water in the household with chlorine or filtration ensure quality. This was appreciated as normally they would need to access dirty river water in flooding situations.

Local ownership:

Perhaps the greatest intangible achievement of the project lies in the increased sense of ownership, community cohesion in making decisions about future WASH community interventions – which will benefit flood affected communities in the future. Involvement in construction and administration of water system improves long term sustainability as this has led to the formulation of plans and strategies as well as management of WASH facilities, which in turn leads to more efficient and effective response in emergency situations.

Improving school infrastructure

Stakeholders felt that the schools sanitation programme also led to a greater awareness of disaster preparation, as it brought people from the community together including parents, teachers and students, who learned skills from the training and went back to schools to form committees dealing with O&M and sanitary use of facilities.

Considering that schools at present are used as evacuation centers, the improvement of WASH facilities led to better sanitary conditions during displacement. The capacity of schools to take in displaced families was increased by

25%, and use of facilities during flooding was in agreement with the mayors and local authorities who were committed to ensuring maintenance of the sanitation facilities and making them available in future emergencies. At Instituto Educ. Sicara Limon school, Oxfam completed sanitation blocks with showers. In subsequent years, families whose houses were flooded relocated to the school, and in 2010 UNICEF built relocation shelters adjacent to the school. Therefore the strategy of upgrading facilities at the schools proved to be an important factor in DRR.

Gender integration:

Women being equally participant in local leadership, were typically represented in equal numbers as men in Water Committees. Hygiene promotion and awareness sessions, were used as a forum to further promote women's empowerment as well as to spread specific health messages for women. Targeted women's health messages in awareness groups included messages on family planning, awareness on violence against women and prevention of cervical cancer carried out by CRC community nurses "*Damas Grises*".

Oxfam Climate change adaptation projects in Cordoba

ASPROCIG has undertaken a number of ARR activities related to their livelihoods programme. In conjunction with the emergency projects, these activities aim to reduce underlying risk factors using community based, traditional methods. Activities include: raising surrounding berms around aquaculture ponds (i.e. compounding soils) to reduce flooding; and planting forest lines (bosque de galleria) to protect lands from erosion.

Analysis: Lessons Learned and Future

Many of the project outputs have contributed directly to Hyogo Framework for Action (HFA) priorities. Targeted communities have been more resilient to face flooding, equipped with the knowledge of household water treatment and storage, as well as having systems in place – either through water filters, or through small scale systems. Some principal lessons learned included the following:

- **Local empowerment:** Project participants found that capacity building and empowerment of community members led to a long term impact, due to frequent changes in government leaders. People trained in 2007 were found to be leading the community in later events and that the first response is at the community level, therefore community leadership skills were frequently put to the test. Strengthening of Defensa Civil, who were present at the community level at the very first stages of flood response, also assisted in this process.
- **Coordination and governance:** Keeping up coordination mechanisms in periods when it is not flooding proved to be difficult, due to competing priorities. However, having a continuous process of analyzing lessons learned and contingency planning would strengthen response in the future.
- **Household Water Treatment:** Sustainability and local procurement proved to be a factor of major importance due to availability of filters should replacements be needed. Oxfam's links with the factory in Colombia which fabricated the colloidal silver filters was effective in producing a filter that was locally acceptable. At the household level, ease of use (i.e. low filtration time and less clogging) and palatability (i.e. cooler water from clay pots) were major factors influencing acceptability and continuous use.

In order for flood affected communities to be better prepared for future flood activity and to link outputs of the project into a wider ranging community based DRR framework, best practices are highlighted, and areas for potential future activity:

- **Improving coverage of safe water and sanitation:** Considering that areas where Oxfam works are in the more rural and remote parts of Cordoba, where access to water and sanitation is poorest, a main factor in reducing risk for the future is to work towards ensuring adequate household coverage, and minimum community coverage at evacuation points for continuous use during periods when people are displaced and risk of disease is highest. Ensuring basic coverage of durable facilities designed for flooding allows the more vulnerable communities to prepare for the anticipated risks of yearly flooding. Experiences gained from the filter distribution could be channeled into a DRR focused household water treatment programme, while at the same time building supply chains that allow for people to purchase filters at locally acceptable rates. Experiences from pilots for rainwater harvesting at household level could also feed into rainwater harvesting at community centres.
- **DRR inputs into Water Systems:** In the planning of new water systems, disaster risk should be considered at all stages, from source selection and siting of infrastructure. Training of the caretakers and guidance to the Water Committees should also take risk into consideration, and information on what steps to take when there are changes to the quality and quantity of water resources at different times of the year and operating procedures during times of extreme flooding. The first step in this would be the collection of data on water cycle variation, quality at different times of the year, against current and projected needs (i.e. quantities) for the population the system serves.

- Networks and alliance building: Networks and information sharing to build knowledge on ARR and WASH within Colombia should be strengthened as there is a lack of “*joined up*” thinking on what types of projects have the most potential and take adaptation into account in the sector. At the local level, advocacy for community level approaches at CREPAD should continue on a regular basis to fit into a local joint DRR strategy. Oxfam and partners would benefit from sharing of experiences and would thus be able to inform government decision-making. For instance many local communities felt that current government mitigation initiatives which target individual households (raising selected individual 270 household’s patio in Momil district, relocation of 59 households) is not an effective mitigation measure, which demonstrates that plans were implemented without community consultation. Longer term policies and strategies on risk reduction – as well as mitigation measures - need to be developed based on shared experience, of which community based interventions form a basis alongside sound scientific evidence collected from Cordoba.
- Preparation of Adaptation Plans and Standardised Guidelines: Through a WASH network, standardized designs and operating procedures for adapted WASH facilities would assist in dissemination of best practices, including raised latrines and community/school sanitation blocks. For water systems, this would also include source intake protection, criteria for siting of schemes in flooding areas, and models for household or community center rainwater harvesting schemes. On a wider level, preparation of adaptation strategies that address water related risks in Cordoba, as a part of a process of developing National Plans for DRR need to be developed. This would integrate adaptation initiatives at local level, and take into account water management in the Sinu and San Jorge basin, and as well, have an overview of mitigation plans in order to ensure a more systematic approach to adaptation.



Water Committee logo on water tank in El Playon.
Photo credit: Oxfam.

What's Next?

There is a general consensus that in the future, flooding is likely to continue on an annual basis, and as a consequence all stakeholders are now stepping up actions to prepare for this reality. Each town is now in the process of preparing a contingency plan through CLOPAD which is now a requirement by law.

To further locally appropriate household and community level intervention, ASPROCIG have started a number of pilot projects. Different technologies are being tested in the more remote and flood affected communities including a pilot rainwater harvesting project is currently providing 11 families with systems including catchment improvement, guttering and storage. Raised composting toilets at households are also being tested as a potential sanitation option to be promoted amongst the farming community.

Oxfam has started a process of baseline data collection in order to develop a 3-year strategy for DRR in Cordoba province. The aim of this initiative is to dispel assumptions on what is needed to integrate DRR into programming in the future and plan on how Oxfam and partners can be involved in supporting appropriate and effective projects to enable households and communities to adapt to flooding. ASPROCIG is now collecting local data to determine needs of communities in order to design this strategy.

The aim of these initiatives is to continue to support vulnerable flood affected communities in Cordoba in the future, and as well, to advocate for sound policies based on experience that will promote future development to take into account communities need to adapt to the effects of climate change.

Colombia DRR Strategy:

The disaster management system, called the National System for Disaster Prevention and Response (SNPAD), was built up following a decentralization process (which provides autonomy to local authorities) and is based on cooperation between national, district and local levels, following the principles of subsidiarity and complementarity. The SNPAD's work is mainly guided by the National Plan for Disaster Prevention and Response, which provides planning strategies and policy vision.

At regional and local level, each decentralized entity has its own action plan. The regional and local committees for disaster risk prevention and response (CREPAD: Regional Committee for the Prevention of Disasters, CLOPAD: Local Committee for the Prevention of Disasters) work differently, depending on the level of development of the entity and the commitment of the local authorities.

Source: Dirección de Prevención y Atención de Desastres (DPAD):

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