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# Environmental Impact Assessments in refugee crises[1]

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## Question

*Where have rapid environmental impact assessments on sustainability of water supply approaches (including identification of mechanisms for aquifer monitoring and recharge) been completed in situations of mass displacement into camps (and spontaneous sites), and how have they been used by international actors to influence government land allocation decision making?*

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[1] Part of a series of queries relating to the Bangladesh Rohingya refugee crisis (WASH series)

# 1. Overview

Although much of the literature found by this rapid review emphasises the necessity of including environmental considerations into the planning of mass displacement camps, and the role of environmental impact assessments (EIAs), there is little publically available literature on the assessments carried out, and the quality of these. The literature specifically highlights the role of previous humanitarian interventions in the overexploitation of groundwater resources, but specific EIAs related to this were limited. **No information or evidence could be found by this review on the use of EIAs to influence land allocation decisions for refugees by Governments. Many of the EIAs reviewed were based on camp locations that had already been decided or allocated and were reactive rather than proactive.** The review highlights a selection of publically accessible examples of the where EIAs (or other environmental assessments) have been carried out in refugee situations, focussing on mentions of WASH and water supply considerations within these.

Findings include:

- **Limited availability of EIAs despite increasing demand**: There is recognition that donors are increasingly asking for EIAs to be undertaken for humanitarian interventions, and they are mandatory for many actors operating in conflict and crises areas, however, access to these assessments is limited. There is also little review of these in academic literature. The influence of these assessments on decision-making and follow up actions is also not clear. Previous EIAs of refugee camps are often referred to in the literature (as are impacts on water sources) but detailed information on lessons learned is elusive. A number of examples have been included in this review, but many of these were carried out post-intervention and allocation of land.
- **Lack of understanding of why and how to integrate environmental issues in emergency WASH**: The importance of integrating environmental issues into humanitarian response has been widely recognised by international actors. This is supported by SPHERE standards and a number of guidelines that have been developed, the use of remote sensing to analyse natural resources is also increasing. However, there is a lack of clear understanding and awareness of why and how environmental issues should be addressed during emergency WASH activities, and evidence of EIAs on WASH specifically is limited.

The examples of EIAs in refugee camps include camps in Ethiopia, Iraq, Jordan, Kenya, Lebanon, South Sudan, Sudan, Tanzania, Thailand and Uganda. The use of a Rapid Environmental Impact Assessment in Haiti after the Earthquake in 2010 is also touched on. This is not an exhaustive list, and reflects the reports that were available publically that could be looked at in the time allotted for this review. In general, WASH considerations are just a small part of a larger EIA for a refugee camp, and these assessments tended to take place once the camp had already been established and on an ad-hoc basis. Some examples of methods for assessing groundwater in refugee camp situations are also provided, especially relating to the use of remote sensing, but again these just provide a small sample of what could be done.

# 2. Use of rapid environmental assessments

## Different types of environmental assessments used in crises

Liljedahl et al (2010) highlight that environmental assessments in crises can have different approaches, they can be reactive (working with assessments of past events), active (doing assessments for ongoing activities) or proactive (to foresee and plan ahead of crises and incidents). A number of donor approaches to help integrate the environment exist.

*Environmental Impact Assessment (EIA)*

Regular EIAs have received much criticism for addressing environmental issues far too late in the decision making processes, stalling the possibilities to mitigate or prevent negative environmental impact in advance, or for that matter, leverage on the environment to better be able to deliver on the mission goals (Liljedahl and Waleij, 2014: p.1). Liljedahl and Waleij (2014: p.2) highlight that some improvements have been made recently in relation to humanitarian responses and environmental impacts, with the updated standards e.g. SPHERE; some environmental champion clusters such as the shelter cluster; deployment of strategically deployed Environmental Field Advisors; and environmental assessments undertaken by e.g. UN High Commissioner for Refugees (UNHCR).

While each EIA has its own context-specific requirements, the International Association of Impact Assessment (IAIA) has defined a set of best practices[2] for how an EIA should be accomplished. These practices provide a reasonable set of requirements for any normal assessment, and include:

- Purposive
- Rigorous
- Practical
- Relevant
- Cost-effective
- Efficient
- Focused
- Adaptive
- Participative
- Interdisciplinary
- Credible
- Integrated
- Transparent
- Systematic

[2] See IAIA Principles of EIA Best Practice, 1999 https://www.iaia.org/uploads/pdf/principlesEA_1.pdf

*Rapid Environmental Impact Assessment (REA)*

Rapid environmental impact assessment (REA) was developed to define and prioritise potential environmental impacts in disaster situations. It is adapted for rapid response situations (e.g. through the use of checklists) with a focus or priority on the identification of the most critical issues. The REA does not replace an EIA but is supposed to fill the gap until a full EIA is appropriate or possible to conduct (FOI, n/d: p.1). Kelly (2017: p.1) who helped develop REA in the early 2000s, explains that it was developed to "provide humanitarian responders with a way to rapidly identify critical environmental issues which would then be integrated into disaster assistance, to improve the effectiveness of relief operations and reduce collateral environmental damage" and that it is currently being reviewed by USAID and the UNEP/OCHA Joint Environment Unit[3].

An REA is based on the standard EIA, but with modifications to match the disaster context, including (Kelly, 2017: p.3):

- Trading accuracy for timeliness
- Using qualitative information, as reliable quantitative data are generally not available for weeks to months after a disaster
- Using a consensus-based non-expert approach, to reflect the fact that a full range of environmental experts is generally not available immediately after a disaster and to avoid single-expert bias.
- Focusing on relief and recovery operational issues, by prioritising issues that were (a) life-threatening, (b) welfare- or livelihood-threatening, and, finally, (c) issues that affected only the environment but neither (a) nor (b).

Originally it was hoped that the REA could be done only based on the Guidelines for Rapid Environmental Impact Assessment, but it was eventually accepted that at least one person with experience in the REA process should be involved in, or directly advise on, field use (Kelly, 2017: p.4). However, it is not clear whether the REAs completed have had any significant long term impact on the relief operations which they reviewed (Kelly, 2017: p.4) (see Haiti below for an example of REA use). Kelly (2017: p.4) highlights that the REA is designed to identify issues but not to assign corresponding responsibilities to address these issues. Also, post disaster environment-focused assessments are infrequently required by donors, undertaken by aid organisation based on their internal policies, or completed in compliance with national laws or regulations after disasters.

*Programmatic Environmental Assessment (PEA)*

Programmatic Environmental Assessment (PEA) is an approach which fits between a strategic environmental assessment[4] and an EIA (Kelly, 2013: p.6). Kelly (2013: p.6) explains that "a PEA looks at programmatic considerations of prospective project activities but not the scale of policy and cross-sector aspects covered in a SEA. For instance, a PEA would look at the direct, indirect and cumulative impacts of the same types of projects happening in different locations". The PEA may identify both broad and specific issues related to the planned projects under an overall

[3] See http://www.eecentre.org/wp-content/uploads/2017/01/Joint-initiative_factsheet.pdf

[4] For more information see FOI, n/d, p. 1

program of assistance, it can replace multiple single EIAs, although there still may need to be more specific assessment of impacts at specific locations which are covered by an assistance programme.

## EIA best practice

There are a number of Environmental Assessment best practice guides that have been developed by international organisations. Some have been highlighted briefly below and further information on these and other environmental assessment tools can be found here, and further information on practical tools for environmental management is here.

According to the literature, although there are a number of guidelines, these are not always followed in humanitarian interventions and there has been a lack of a systematic incorporation of EIA into disaster management (Joint UNEP/OCHA Environment Unit, 2014). Few humanitarian practitioners contest the idea that the environment is important. However, a study into the environment and humanitarian action by the Joint UNEP/OCHA Environment Unit (2014: p.37), highlighted that despite this recognition, there has been little progress in mainstreaming the environment in humanitarian action. The international humanitarian community as a whole does not focus strongly on environmental issues and the extent to which humanitarian organisations address environmental issues in their programmes varies (Mowjee et al, 2015: p.47). Kelly (2013[5]) also highlights that the environment is being dealt with as a cross-cutting issue in humanitarian action, meaning that there can be issues with roles, responsibilities, and coordination of efforts between clusters, which mean that the environmental dimension can fail to be addressed fully.

*The SPHERE Project: Humanitarian Charter and Minimum Standards in Humanitarian Response*

The SPHERE Project can be found here and includes standards to minimise environmental impacts during operations and reduce conflict potential over access to natural resources. These emergency standards are key references when designing planned settlements.

*Framework for Assessing, Monitoring and Evaluating the Environment in Refugee-Related Operations (FRAME).*

The FRAME Toolkit, available here, is designed for managers and field staff to address issues of environmental assessment, monitoring and evaluation. Full details of the REA process can be found in the FRAME toolkit. Normally, a team of three should carry out the REA, including a local environmental expert (e.g. from an NGO), a member of the local community and a member of the international humanitarian community (UNHCR, n/d). It provides an interesting overview of different expected impacts, threats and benefits; and different more specific checklists and tools. This Toolkit consists of a series of analytical, planning and management tools which will help ensure:

- timely collection of baseline data on the state of the environment that will help influence decisions and actions taken at all phases of a relief operation;

[5] And Doug Weir, 2016 http://www.theecologist.org/News/news_analysis/2987616/jordan_grapples_with_the_environmental_consequences_of_its_refugee_crisis.html

- that potentially negative impacts of a refugee or returnee operation are identified and appropriate remedial steps taken to counteract or at least limit the possible impacts;
- appropriate monitoring systems are put in place;
- affected communities are consulted and helped to be part of the project or programme process, through the use of a series of participatory approaches and tools;
- activities are routinely evaluated, with the results being used to further improve project or programme management;
- data are analysed, lessons are learned and information is shared;
- government authorities are informed of decisions taken or recommended following conclusion of a particular activity; and
- that the investigations will have been undertaken using technically sound and appropriate guidance.

*UNHCR Emergency Information Management Toolkit*

The following is taken from the UNHCR Emergency Information Management Toolkit section on the Minimum sectoral data for Environment (UNHCR, n/d). The toolkit recognises that there is no comprehensive environmental management strategy that can be applied to all emergency situations. Site-specific information can be gathered by undertaking a REA, if possible, within a period of 48-72 hours, followed by a more comprehensive Environmental Assessment (EA). The more in-depth EA requires more time and resources in order to develop an appropriate strategy based on the specific environmental indicators observed (using the FRAME Toolkit). From the REA, the initial environmental management strategy should be developed as quickly as possible, along with local Government actors such as forestry departments. An Inter-agency needs assessment should be conducted. The assessment should consider energy needs for cooking and lighting as well as environmental impact factors such as fuel sources, water quality and quantity, solid waste management etc. A comprehensive environmental management strategy should be developed for the site and immediate surroundings as soon as possible. Referencing the FRAME Toolkit, a more comprehensive Environmental Assessment (EA) should be developed following a highly participatory community environmental action plan. The FRAME Toolkit also highlights opportunities for using the latest technology with geographical information systems for environment assessments.

**EIA in WASH**

Many of the tools discussed above contain elements that highlight potential long-term impacts of WASH projects and offer practical solutions, however, there is a lack of systematic approach with regards to environmental-related issues in WASH Cluster Agencies (GWC, 2009b). Awareness of the tools available is also low and they are rarely used during WASH operations (Care International, 2008: p.2). The Global WASH Cluster has developed some practical guidance on potential environment impacts of WASH activities during humanitarian interventions. This includes a checklist, key concepts and considerations. Key considerations in relation to water include (GWC, 2009a: p.2)

- Short-term over-abstraction is acceptable, if mitigated;
- The potential for conflict over new or expanded water sources needs to be assessed and addressed;

- The future use of water sources needs to be planned;
- Wastewater should be avoided.

GWC (2009a) also suggest consideration of adopting an Integrated Water Resource Management Approach into WASH interventions in emergency contexts, where the potential effect of water abstraction, human and domestic waste disposal and physical resource use is both analysed and addressed. Other positive steps suggested by GWC (2009b: p.2) include: undertake a rapid WASH-oriented environmental assessment at the Cluster level; identify basic WASH-environmental indicators for monitoring purposes; and respect, to the extent possible, the guidance and standards outlined by SPHERE in relation to the siting and construction of WASH facilities.

**Sustainable Sanitation and Water Management Toolbox**

The Sustainable Sanitation and Water Management (SSWM) Toolbox provides an integrative tool for capacity development on the local level. As part of the SSWM tool there is a useful section on SSWM in Humanitarian Crises, a Specific Topic Entry Page (STEP) that was developed by Cewas Middle East and its partners. The STEP is designed as a knowledge platform for practitioners involved in water, sanitation or hygiene-promotion activities in humanitarian crises, with a special focus on the Middle East and Northern Africa (MENA) region. The content covers both hardware and software approaches and aims to support practitioners in planning, implementing and sustaining water, sanitation and hygiene promotion interventions in different settings of humanitarian intervention (such as Camps, Prolonged Encampments, Rural Settings and Urban Settings).

*Water supply*

The Toolkit also provides useful information on water supply in camps and techniques, including water quality testing. There is also a more general Toolkit page on reuse and recharge of water, which may be useful.

**Use of remote sensing**

Information on the geological and hydrological situation in adequate detail for refugee camps is essential to assess water supply and valuable drilling sites, yet it is often missing or unavailable. Remote sensing is useful to gather the required information in a reasonable timeframe by greatly reducing the amount of fieldwork needed (Wendt et al, 2016: p.3). Assisting groundwater exploration by remote sensing data analysis is not a new development, but it has not been widely adopted by the humanitarian community as interfaces between humanitarian organisations and GI-scientists were missing (Wendt et al, 2015). One project that aimed to bridge this gap was the EO4HumEn initiative, an Earth Observation-based service to support humanitarian operations through monitoring population and natural resources in refugee/internally displaced persons (IDP) camps. In particular, the exploration for potential groundwater borehole sites for the water supply of refugee and IDP camps. Within the project, hydrogeological reconnaissance maps are produced to supply a rapid assessment of the availability of groundwater by integrating remote sensing data, optical very-high resolution (VHR) imagery, and Synthetic Aperture Radar (SAR) data (Wendt et al, 2015). The project is currently being continued as EO4HumEn+.

# 3. Examples of EIAs and water supply assessments in humanitarian crises

The following are a selection of examples of refugee situations where EIAs (or other environmental assessments) have been carried out. This is not an exhaustive list, and reflects the reports that were available publically that could be looked at in the time allotted for this review. EIAs in refugee situations are often made reference to broadly in literature, however, many were not easily accessible or could not be found. No REAs specifically on water supply and resources could be found. In general, WASH considerations are just a small part of a larger EIA for a refugee camp, and these assessments tended to take place once the camp had already been established and on an ad-hoc basis. Some examples of methods for assessing groundwater in refugee camp situations are also provided in the next section, but again this just provides some examples of what is being done.

## Syrian refugees in Lebanon

An Environmental Assessment of Syrian refugees in Lebanon was carried out between May and July 2014. The report was based on the review of national legislation and reports, consultations with various individuals, and selected field visits. It found increased pollution of surface and groundwater. The report estimated the increase in domestic water demand due to the refugees between 43 to 70 Million Cubic Meter (MCM) by the end of 2014. This incremental water demand of the refugees corresponds to an increase of the national water demand between 8 and 12 percent (MOE/EU/UNDP, 2014: p.4). It concluded that depletion of water resources. According to the assessment, the main water sources used by refugees are the public water network (30 percent), wells (24 percent) and public reservoirs/standpipes (22 percent), noting that groundwater constitutes the largest share of the sources of the public water network and of public reservoirs. As such, the assessment confirms that the increase in water demand due to the refugees is exacerbating the current stresses on water resources in general and on groundwater resources in particular. This has been confirmed by available data from the monitoring of water table levels during the period of April 2013 to April 2014 which showed a decrease ranging between 1 and 20 meters in a number of wells in different Lebanese regions (MOE/EU/UNDP, 2014: p.5).

## Syrian refugees in Jordan

A Rapid Environmental Impact Assessment for the Zaatari Refugee Camp (Palo, 2014 in Farishta, 2014), was conducted for UNHCR from September 2013 to December 2013. The EIA used the Rapid Impact Assessment Matrix (RIAM) methodology for the assessment to determine the magnitude of impact on environmental conditions. The EIA concluded that the establishment of the camp had an overall significant negative impact on the change of the environment when compared to conditions prior to the Syrian refugee influx in Jordan. Water use by the refugee camp has shown to have a significant negative impact on baseline environmental conditions due to the existing water shortage in the region and the increase of non-revenue losses. Non-revenue losses resulted from transporting water via trucks and leakages from poor water infrastructure. The aquifer near the Zaatari camp has been of concern to the Government of Jordan, however the EIA concluded that the risk of contamination of the groundwater supply is small. In contrast, the EIA concluded that the waste water management and solid waste management at the camp site has had a significant negative impact on baseline conditions (Farishta, 2014: p.14-15). The

site selection process for the Zaatari refugee camp required several important criteria, however the long-term impacts to the water supply were not deeply considered (Farishta, 2014: p.26).

UNEP/UNDP (2015: p.7) commissioned a first-stage rapid assessment of the potential (and actual) impact of the influx of Syrian refugees on the environment in Jordan. Priorities of the study included impacts on: the water quantity and quality; soil degradation and rangelands; biodiversity and ecosystem services; air pollution; and hazardous waste and medical waste. The rapid assessment was developed through the review and synthesis of existing literature, including national state of the environment reports and national environmental strategies and action plans, and it followed the Driver-Pressure-State-Impact-Response (DPSIR) framework methodology, which was developed to describe the relationships and interactions between society and the environment. The study found that the natural capital in Jordan is under substantial pressure due to influx of Syrian refugees. Water over-abstraction and increased wastewater generation has resulted in accelerated mining of renewable groundwater resources and pressures on treatment plants (UNEP/UNDP, 2015: p.7).

## IDP camps in Khanke, Iraq

The population in the Village of Khanke increased rapidly in 2013 due to the influx of IDPs, increasing demand for water supply. A proposed solution consisted of upgrading the existing water treatment plant in Khanke and the implementation of a 4km network to convey the necessary water supply; as part of the project, an EIA was undertaken (SETS, 2015: p.5). The methodology used included field visits and data collection from different sources (e.g. local authorities, desk research, tests conducted, field work, etc.) followed by analysis of the collected information (SETS, 2015: p.5). It was found that the only long term impact on water supply is a positive one which is the increase in water supply to the population, the expansion in area coverage and the improvement of the drinking water quality in Khanke. The EIA highlighted that monitoring and proper employment of the Environmental Management Plan were necessary, especially with regard to water level at Lake Mosul (SETS, 2015: p.51).

## Darfur, Sudan

Displacement in South Darfur led to the drilling of numerous boreholes to meet immediate water needs where no easily accessible water supplies existed. However, in many places the number of boreholes posed eventual problems as groundwater extraction exceeded recharge rates (GWC, 2009a; p.1). A focus on immediately supplying water to camps to the exclusion of natural resource management led to the overuse of groundwater in northern Darfur. This led to wells going dry, which compounded the water supply challenges. The situation was made worse by a lack of overall preparedness and planning for water needs (GWC, 2009a: Tearfund, 2007). A Water Resource Vulnerability Assessment (WRVA) by Tearfund (2007) focused on the water needs of the IDPs in camps in Darfur, Sudan. This assessment was undertaken following the recommendation made in the report “Darfur: relief in a vulnerable environment (D:RIVE)”, which called for a framework of sustainable resource management to be integrated through the Darfur relief response (Tearfund, 2007: p.5). The assessments made use of records of water provision in camps (including drilling and pumping records), field observations, discussions with stakeholders in Darfur and Khartoum, and previous hydrogeological reports. Two approaches were used in the groundwater assessments (Tearfund, 2007: p.6):

1. Physical evidence - groundwater levels, groundwater monitoring, or evidence of boreholes drying up - to demonstrate the extent, if any, of groundwater depletion.

2. A ‘Water Budget’ approach, assessing the likely recharge to the local aquifer, the current withdrawals of water from the aquifer, and the likely balance, or lack of it, between the two.

The report found that the main risk to groundwater supplies in Darfur’s camps was of water shortages in a year of low rainfall in vulnerable camps. Groundwater monitoring and analysis is needed to identify the extent to which hydraulic connections between wadi sands and aquifers below camps exist – and therefore to be able to better define the vulnerability of the camps’ supplies in a year of low rainfall. Given the current absence of this analysis the camps are defined as potentially vulnerable (Tearfund, 2007: p.5).

## Gambela camp, Ethiopia

Over 190,000 South Sudanese refugees inhabited the Gambela camps in Ethiopia in 2014, where humanitarian needs were extensive. EO4HumEn produced a hydrogeological reconnaissance map of the area around the refugee camp Kule near Itang in the Gambela Peoples' Region in Ethiopia. The existing borehole near the camp site had a depth of 65m and yielded water with high contents of Magnesium, Iron and Fluorine, making it unfit for human consumption. The analysis suggested two areas for further exploration for groundwater. Both sites are located upstream from the camp.

## Bentiu protection of civilians (POC) site, South Sudan

Groundwater Relief[6] carried out a groundwater assessment of Bentiu POC, South Sudan in March 2016. This was commissioned by the International Organisation for Migration (IOM) to assess the groundwater infrastructure at the Bentiu POC, hosting over 120,000 people at the time of the assessment. Groundwater Relief assessed the capacity and efficiency of each of the boreholes at the camp through carrying out pumping tests on the existing boreholes and borehole camera surveys to investigate borehole condition. Recommendations were made to improve the utilisation of the existing groundwater supply infrastructure improving output from the existing boreholes by an additional 50%, dramatically increasing water output for the camp population. The work resulted in a robust hydrogeological conceptual model of the site area being developed. This advanced hydrogeological understanding will allow long term impacts of groundwater extraction to be understood better, and inform the drilling of future boreholes. In addition a groundwater monitoring programme was established for the site using automatic and manual instrumentation. Local and international site staff were trained in basic hydrogeological data collection, to ensure the long term success of the monitoring.

## Mtendeli refugee camp, Tanzania

Another example was a sturdy commissioned by Medecins Sans Frontieres Holland (MSF-OCA) for Groundwater Relief to carry out a remote sensing study at Mtendeli Refugee Camp, Tanzania in 2016, in order to identify potential large scale lineament features which may indicate regional aquifer systems. Topographic and aerial magnetic data were used to identify potential larger

[6] A Charitable Incorporated Organisation that aims to alleviate poverty, by helping others develop and manage groundwater resources

scale lineaments located within the near proximity of the camps. The data was placed onto an ArcView GIS online map to allow aid workers to view and interrogate the data in the field.

## Rwamwanja settlement, Uganda

The Rwamwanja site was one of the old refugee settlements which were selected by the Government of Uganda in the early 1960's to accommodate refugees. On 17th April 2012, the Uganda Government re-opened the Rwamwanja Settlement, for use by the Congolese refugees who were fleeing their country due to the ongoing conflicts there. A scoping exercise revealed that the refugee Settlement was likely to lead to considerable land degradation including deforestation and stress on water resources, hence under schedule III of the Ugandan National Environment Act, the Rwamwanja Refugee Settlement project qualified for a full EIA (IUCN et al, 2013: p.10). However, the decision to host Congolese refugees had already been taken during the EIA, hence, this influenced the recommendations of the EIA. The EIA found that the project area is generally water stressed with almost no water during the dry season. At the time of conducting the assessment however, there was an estimated population of refugees of 28,000 served by 38 boreholes that are functional. In addition, 16 more were planned to be dug. Water concerns were classified as high in the EIA and suggested mitigation measures included: conducting water and water sources analysis to ensure portability; through sensitisation encourage Rain Water Harvesting; plan to conduct an adequate hydro geological survey to confirm sustainability; develop an appropriate management and monitoring system of water quality and quantity (IUCN et al, 2013: p.22).

## Kalobeyei and Kakuma refugee camps, Northern Kenya

Kalobeyei settlement in Northern Kenya opened in June 2016 in order to decongest the nearby Kakuma refugee camp, and is now hosting close to 6,000 refugees, mostly from South Sudan. The hybrid settlement aims to integrate the refugees with the local host population, creating a strong bond in trade, education, and livelihoods. It offers an opportunity to try a more durable solution to hosting refugees since the refugees will live, farm and trade side-by-side with the local population. This new hybrid settlement has the capacity to accommodate 60,000 refugees and 23,000 people from the host population. UNHCR commissioned an EIA into the proposed Kalobeyei settlement that was completed in March 2016 by Norken International Limited. The EIA found that overall, provided the proposed works are implemented with due attention to the mitigation and management measures outlined in the EIA, the project would not pose any serious adverse and negative environmental impacts. Mitigation measures to account for increased demand for water supply (which was deemed high risk) included (Norken International Limited, 2016: p.51):

- Ensure that sufficient data is obtained for each of the borehole water yield to avoid over abstraction;
- To ensure that no borehole is drilled through unconfined aquifers and to estimate their sustainable pumping capacity - an adequate hydro geological survey will be conducted later on;
- Monitor condition of aquifer. This should involve designating some of the boreholes for ground water monitoring purposes only. This should be installed with data loggers improve the accuracy and consistency of monitoring aquifer static water levels, abstraction rates and water quality;

- Identify points of ground water re-charge targeting utilisation of the large amounts of run-off that is usually experienced at any rain interval in the project area; and
- An appropriate management and a comprehensive monitoring system of water quality and quantity will be developed.

A geophysical exploration of groundwater at the Kakuma refugee camp and the proposed Kalobeyei refugee camp in Turkana County, Kenya, was carried out for UNHCR with support from Advisian, Geoscientists without Borders and IsraAID (UNHCR et al, 2016). The Kakuma Refugee Camp is located in the semi-arid Turkana County of Northwestern Kenya, it was designed for a Camp population of 100,000. As of March 16, 2016, the Camp was home to 187,867 refugees who were entirely dependent on groundwater pumped from 12 wells. The Camp water supply is faced with the challenges of increasing salinity during drought conditions, an uneven geographical distribution of water wells, frequent well failures, dry or saline exploratory boreholes, and an incomplete understanding of the aquifer systems of the area (more information from here). The program aimed to: provide drilling targets for new water wells in the Camp; introduce a new approach to water exploration in Kakuma by combining extensive surveys of electrical resistivity tomography with seismic refraction; provide water well drilling targets for the semi-nomadic Turkana in close proximity to a proposed new 60,000 person refugee Camp at Kalobeyei, 20km west of Kakuma; and add to the overall understanding of the hydrogeology of the area (UNHCR et al, 2016: p.2).

## Refugee camps in Dadaab, North-Eastern Kenya

At the request of UNHCR and CARE International, ProAct led a multi-agency team to conduct an EIA mission to Dadaab, North-Eastern Kenya, to assess the establishment of a proposed new refugee camp in 2009 (ProAct network, 2009: p.2). An EIA for the proposed new camp was required under Kenya's Environmental Management and Co-ordination Act (EMCA) 1999 and the Environmental (Impacts Assessment and Audit) Regulation 2003. It was also part of UNHCR's own environmental management requirements (ProAct network, 2009: p.2).

At the time of the assessment, Dadaab region hosted three refugee camps – Ifo, Dagahaly and Hagadera. Designed for a total of 90,000 people, they accommodated more than 280,000 refugees and 100,000 more people were predicted to arrive by UNHCR by the end of 2009 (ProAct network, 2009: p.2). The assessment was carried out through a combination of desk research, on-site investigations and consultations with different stakeholder groups (ProAct network, 2009: p.3). Key findings emerging from the analysis of the impacts of the proposed new camp included:

- 10,950,000 m3 of water would need to be provided;
- 300,660 tonnes of firewood would be consumed;
- 438,000 tonnes of waste that would need to be treated.

The assessment considered the potential environmental impact of the proposed new camp as high. It recommended UNHCR to develop coherent environmental interventions for the Dadaab refugee programme to ensure mitigations necessary to attain the stated objective of a “model camp in terms of environmental management” (ProAct network, 2009: p.3). Two sets of recommendations were made on the basis of the ProAct-led assessment, some of which were of a general nature in relation to environmental management in the Dadaab context and others in

direct reference to the proposed new site (ProAct network, 2009: p.3). No further information on these recommendations could be found online.

## Thailand Burma Border Consortium

The Thailand Burma Border Consortium (TBBC) provides fuel for cooking, food and shelter material to over 140,000 refugees in nine Burmese refugee camps in Thailand (Morgado, 2012: p.1). A rapid environmental impact assessment (EIA) of TBBC's program and activities was conducted by an external consultant in response to a request by one its donor agencies, Swedish International Development Agency (Sida). The location of the refugee camps and its physical planning is set by the Ministry of Interior from the Royal Thai Government. However, TBBC is responsible for the physical planning of the rented land used for the Community Agriculture and Nutrition (CAN) Programme and forestation activities as well as its supply storage warehouses.

The management of water supply in quality and quantity and respective sanitation is not the direct responsibility of TBBC. However, TBBC utilises the water supplied to the camp and its food and charcoal supplies are sources of waste in the camp. The cooking oil, fish paste, charcoal and the respective packaging provided by TBBC require close monitoring to minimise the potential negative impact on environment.

The location of the refugee camps is determined by the Ministry of Interior from the Royal Thai Government. The government's expectation is that these camps will be temporary. Consequently, environmental aspects are not considered in the selection of the site and respective area required. This leads to multiple issues such as overcrowding and the location of camps within protected wildlife areas, on steep slopes or in river beds which are susceptible to regular or extreme weather events and natural disasters (Morgado, 2012: p.15).

## Haiti earthquake

Kelly and Solberg (2011: p.5) carried out a REA on behalf of USAID in February/March 2010 to circumvent environmentally unwise relief and recovery decisions in the aftermath of the 2010 Haiti earthquake. The USAID Haiti REA was based on an assessment methodology specifically designed for use in the disaster context, focussing separate assessment efforts on the impact of (1) external relief and recovery operations (Organisation level assessment - OLA) and (2) disaster survivor perceptions and actions on the environment (Community Level Assessment – CLA) in Port au Prince, rural earthquake-affected areas and destination areas for those affected by the earthquake (Kelly and Solberg, 2011: p.20). The relief organisation and disaster survivor information on disaster-related environmental issues is combined into a single prioritised list of salient disaster-related environmental issues. This list is then reviewed to identify specific actions which could be implemented to (1) avoid (2) reduce, or (3) mitigate the expected negative environmental impacts (Kelly and Solberg, 2011: p.20). Recommendations from the REA related to water supply and resources included: the improvement of drainage at and near shelter sites to reduce flooding and post-storm standing water (shelter sites in extremely flood prone areas should be moved) (Kelly and Solberg, 2011: p.6); distribution of safe storage containers and point-of-use chlorination products if household drinking water storage was routinely contaminated (Kelly and Solberg, 2011: p.6).

A Programmatic Environmental Impact Assessment (PEA) for relocation support activities was also commissioned by IOM in December 2010 after a post-earthquake assessment determined

that 100,000 disaster survivors needed priority relocation to safer shelter sites, with an estimated 37,200 persons needing immediate relocation (Sun Mountain International, 2010: p.6). Given the likelihood of additional relocation needs, the PEA used the existing Corail Sector 4 temporary relocation site as an illustrative case study of current temporary relocation practice in Haiti and developed a model approach to temporary relocation site selection and development for other potential locations in Haiti (Sun Mountain International, 2010: p.6). The PEA reviewed the Proposed Action plans to install a reticulated supply network supplied by pumping from a well 5km from the site. Although this was seen as a logical way to addresses one problem (the unsustainable and costly tankering), it raised several other issues (potability and management). The PEA also highlighted that this would increase the overall permanency of the larger Corail de facto settlement, resulting in increased environmental damage, and would also increase the value and competition of the land (with provision of potable water) (Sun Mountain International, 2010: p.74).

# 4. References


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## Key websites

- Global WASH Cluster: http://washcluster.net/
- Humanitarian Response: https://www.humanitarianresponse.info/en
- Sustainable Sanitation and Water Management: https://www.sswm.info/

- SSWM in Humanitarian Crises: https://www.sswm.info/category/step-sswm-humanitarian-crises/introduction
- Environmental Peacebuilding: https://environmentalpeacebuilding.org/
- ProAct Network: http://www.proactnetwork.org/proactwebsite_3/

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## About this report

*This report is based on five days of desk-based research. The K4D research helpdesk provides rapid syntheses of a selection of recent relevant literature and international expert thinking in response to specific questions relating to international development. For any enquiries, contact helpdesk@k4d.info.*

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