



WASH ASSESSMENT

Kayin, Myanmar

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Introduction

Première Urgence Internationale (PUI) is a non-governmental organization seeking to promote international solidarity, and is also non-profit, politically unaligned and secular. Its army of personnel mobilize on a daily basis to meet the basic needs of civilian victims who have been put in danger, marginalized or forced to flee as a result of natural catastrophes, wars and economic collapse. Born from the fusion of two French NGOs in 2011, PUI relies upon more than 30 years of experience of field work in a total of 50 countries to adapt its programs to each humanitarian context and to the most vulnerable populations. PUI currently supports around 3 million people across a few dozen countries, not only in Africa, Asia, the Middle East and south Caucasia but also in France. Its teams execute an average of 250 projects per year, in areas such as food security, health, nutrition, construction and restoration of infrastructure, water, sanitation and hygiene, as well as economic revival. Their overall objective is one of bringing a global response to populations affected by crisis situations, and to supervise their recovery so they can quickly regain autonomy. Première Urgence Internationale (PUI) entered Myanmar/ Burma in 1984 as Aide Médicale Internationale (AMI), training medical teams on the border and managing health in Thai border camps.

Aquassistance is the international aid organization of the SUEZ Group staff providing support to populations in need in the areas of water, sanitation and waste.

It was founded in 1994 by “Lyonnaise des Eaux” by employees who established potable water supplies for displaced populations in Rwanda during the Rwandan genocide. Relying on 750 members of the SUEZ Group (active or retired), Aquassistance has a project portfolio of 80 in 20 countries. Aquassistance has two methods of intervention for projects: integrated management (engineering, finance, management...) and technical assistance (providing help for other NGOs in command). Populations are offered on-the-ground and remote access to the professional skills of our volunteer members and to appropriate material and financial resources in cases of development aid or emergency response.

Context

General context

Demographics, politics, economy and security

Myanmar is a country of 678,528km² and a population >51Million. Myanmar count 7 states. Kayin consists of 7 townships. State’s population is 1.5M (2014 census, The Republic of Union of Myanmar), 3% of Myanmar population, for 48 inh./km² (national average: 76 inh./km²). 78% of Kayin’s population live in rural areas. Average household (HH) in Kayin includes 4.7 people (national average: 4.4 people/ HH) and 39% are <15yo. Here below is the detailed population figures for Kayin State (2014 National census. Kayin state report. Ministry of Immigration and population, 2015):

District	Total Pop. (individuals)	% Females
Hpa An: Hpa-an Township - Hlaingbwe Township - Thandaunggyi Township	783 510	51%
Pharpon (Hpapun): Hpapun Township, Hpapun, Kamamaung	35 085	49%
Myawady: Myawaddy Township	210 540	49%
Kawkereik: Kawkareik Township, Kyain Seikgyi Township	475 171	51%
Total state population	1 504 306	51%

Justification of the assessment

In Kayin state, main issues are found in ethnic armed controlled groups where they provide WaSH, Health and agricultural services. In October 2015 the cease-fire was signed and offered interesting opportunities for KDHW (Karen Department of Health and Welfare), KAD (Kawthoolei Agriculture Department) and governmental responsible. Reconciliations initiatives between governmental and non-governmental actors are propitious for harmonizing, information collection and coordination, which will promote actions of PUI in direction to most vulnerable populations. In May 2019, PUI has linked with AFD and Suez foundation for a WaSH proposal.

This assessment aims to confirm/ adjust WaSH technical components planned in the proposal and to assess potential future interventions in Kayin state.

The two partnership agreements between AFD, Suez Foundation and PUI are expected to be signed at the end of 2019. SUDO department support aims to increase PUI's chances of obtaining the requested grants and to collect relevant data necessary for the opening of a new operational base. Furthermore, PUI team in Myanmar identified other strategic alliances within the Myanmar Humanitarian Fund call of proposals, notably a potential consortium with NRC for a response addressed to displaced people in Kayin. This assessment will be highly considered as a qualitative investment from PUI and offer a good visibility within the humanitarian coordination.

Myanmar is in triple transition phase, from military rule to democratic governance, from a state-controlled to a market-oriented economy, and from decades of conflict with ethnic minorities to an effort at finding peace (World Bank, Oct 2018). The peace process remains fragile and uneven, with conflict escalating in Kachin and northern Shan States. Combined with high levels of insecurity and decades of underinvestment in rural areas, communities in conflict-affected areas – some of which are among the poorest in Myanmar – are facing significant gaps in access to essential infrastructure, service provision and human development indicators. Myanmar has a one of the lowest revenue per inhabitant in the region. Its potential is important in terms of mining, Oil and Gas, Forestry. Soils are fertile. Despite the potential, growth is limited due to instability. Population is mostly rural (60%) and practice food agriculture, mainly rice. Poverty is around 37.5% and is concentrated in rural areas in conflict-affected areas such as Chin, Kachin, Rakhine and Kayin. The area is prone to floods, cyclones (e.g. Nargis, 2008), landslide, tsunami, food insecurity, active armed conflict, intercommunal tensions and a high range of criminality linked to drug and human trafficking. Myanmar ranks 3/187 countries on the global index of climate risks.

South East has known decades of armed conflict, which displaced hundreds of thousands of people in the country and in Thailand. According to TBC (Human security in SE Myanmar, The Border Consortium, 2018.) “3,700+ villages have been destroyed, relocated or abandoned in south-eastern Myanmar between 1996 and 2011. After 68 years of conflict, cease-fire and elections in 2015 show a change but ethnic groups still have their own administrative system. Border areas of Kachin, Kayin, Mon and Shan states, and Tanintharyi region, each of which were affected by conflict, have some of the worst measures of access to basic social services and participation in economic activities. Kayin and Tanintharyi have the highest percentage of households using unimproved water sources, and, along with Rakhine, the lowest percentage of households with access to basic sanitation (Myanmar Living Conditions Survey, 2017). Kayin has some of the heaviest mine contamination in the country and, with Bago, the highest number of recorded victims. Two of Kayin’s townships, Hlaingbwe and Hpa-An, have a medium level flood risk. New incidence of conflict-induced displacement has reduced significantly estimating over 11,000 people have been displaced by conflict between 2013 and 2018 (<https://www.theborderconsortium.org/media/114642/TBC-Human-Security-in-South-Eastern-Myanmar-2018.pdf>, p11 (or Annex 1 in full report). Overall, about 50,000 IDPs still remain in camps or in villages (Internal Displaced People). 9 refugees camps remain in Thailand in 2019 (World Bank, 2017 data. OCDE, 2017. HRP, UNOCHA, 2019) for a population or 97,577 people (90% of Karen or Karenni), out of whom 80,048 refugees are located in camps across the Kayin state Border in Thailand (Verified population, UNHCR. Cited in Annual Report – The Border Consortium, 2018). Active fighting are still happening around IDPs camps in Myanmar. Myaing Guy Ngu camp count 5,000 IDPs, Aye Thu Ta 2,500 and Kyar Inn Kyi 3,000 (Key Informant Interviews notes). Access to humanitarian is limited and landmine contamination hinder any return from IDPs. In other areas, no massive fight has happen since 2012-2013. However, territory is heavily fragmented and still under control of different armed groups, despite cease-fire a few groups have not signed yet.

Mission scope

Objectives

- 1: Define long-term WaSH strategy and recommendations for future WaSH proposals
- 2: Assess and adapt if necessary technical component of AFD/ Suez Foundation Proposal

Methodology

The assessment was carried out in Hpa-An and Kawkareik townships, Kayin state (For detailed locations, please refer to the map below (or Annex 2 in the full report). It includes secondary data analysis ((see Annex 4 in full report) and primary data collection and analysis :

- On-site visual assessment : **7 Villages, 4 Health care facilities, 11 Schools**
- **26 Interviews:** UN agencies, Government and non-state actors, INGOs, private companies (for contact list, see Annex 3 in full report)
- **10 Focus group discussion** with 49 people, 33 men and 16 women (traditional leaders, population, health personals, education personals, monks)

Geography, geology, hydrology and soils

Kayin State sits on the international border with Thailand and borders Kayah, Nanyitaw, Bago, and Mon. The state covers 30,385 km². It is influenced by tropical monsoon climate which includes south East monsoon: widespread coverage of rain cloud and heavy rainfall and thunder storm (May and October) and North West monsoon with less cloud, slight rainfall and mild temperature. July receives the highest rainfall, over 1000 mm, followed by August. Annual rainfall is about 4,267mm on average on the last 40 years (<https://ewsdata.rightsindevelopment.org/>).

Annual temperature is 27.2°C. Myanmar has faced complex plate tectonics and still major earthquake occurs. Kayin state is located on the NW-SE liner region (See geological map in Annex 1 in full report), in the middle-segment of the eastern highlands between Shan Plateau and Tanintharyi ranges. The northern part and the eastern part are mountains and the rest of the state is formed either of lowlands or of low hills. Limited geological investigations have been carried out in Kayin State. The prominent river in the study area is Salween (Thanlwin) River, 2815 Km long originates at Tibetan Highland of China and enters into Gulf of Martaban in Adman Sea. It is amongst the ten most polluted rivers in the world (The Millennium Project, 2010).

Its tributaries are the Gyaing and Donthami Rivers and other rivers useful for agriculture and navigation are Gyaing River and Donthami River. Apart from these drainage, there are many small streams flowing in the region. Five major soil types can be observed in Hpa-an Township. Hilly regions have mountain soil, primitive soil, forest soil and lateritic soil. Meadow swampy soil develops in the plain area.

- **Expert measurement and testing:** Chemistry - pH, Conductivity (µS), TH (°f), TA (°f), TAC (°f), Iron (mg/l), DCO (mg/l), Turbidity(NTU), Flora bacterium (UFC/ml) - Hydrology, hydrogeology and Hydraulics: piezometry, topography, satellite imagery.

Limits of the study

This mission has the following limits:

- **Scope, timeframe and methodology:** this mission lasted for 14 days including 4 days of interviews, 6 days of field visit and 4 days of transportation (international and national). According to the timing of the mission, the methodology has been qualitative. Hence, only some trends are underlined here, but may not be representative of all contexts and populations in Kayin state.
- **Security and access:** negotiation in the field and in the main town did not allow a fluid access to the field and the team faced restriction of access (2 Travel Authorizations have been rejected).

- **Access to data and triangulation:** for reasons of sensitivity and confidentiality, it was not possible to get data from non-government actors, such as maps, lists of facilities or population figures. Population figures have been triangulate from different sources and observation but may differ widely from the reality.

Implementing partners

(A detailed 3Ws is available in Annex 2 in full report)

Main WaSH actors in South East figure thereafter:

- **Government :** Direction of Rural Development, Ministry of Health, Ministry of Education, Municipality
- **Non state actors:** KNU factions 1 to 7 (Including KNU MoH, Karen Department of Health and Welfare (KDHW)), Border Guard forces, Democratic Karen Buddhist Army (DKBA)
- **UN Agencies:** UNICEF, UNHCR
- **Private sector (main):** Drilling companies, Bottled water factories, Suez and a wide range of suppliers and service providers
- **NGOs** (Coordination meeting minutes, UNICEF + KII personal notes) : Save the children international, Malteser International (MI), ADRA Myanmar, CPI (community mobilization in camps), Norwegian Refugee Council (NRC), International Rescue Committee (IRC), Peace Winds Japan (PWJ), Pacts Myanmar, The Boarder Consortium.

Main findings

Access to water, sanitation and hygiene

This assessment shows that main water related disease are, in order of priority: diarrhea, malaria, dengue, chikungunya. A diarrhea outbreak has been mentioned in 2016. Most of the population in NGCA (Non Government Controlled Areas) is frequently affected by diarrhea, which KDHW (Karen Department of Health and Welfare) link to access to water quality. However, it was not possible to get precise epidemiological information, neither at health facility level, nor at township level. Especially in NGCA, population seem to have very challenging access to health services. In remote villages, midwife assistant, community health workers or emergency medics ensure basic services or referral. From interviews, midwives and nurses are in charge in average of 5 to 9 villages, sometimes providing assistance at their own home. The following underline potential links between health and water, sanitation and hygiene.

⇒ Governance

Defined for the 2016-2030 period, the national WaSH strategy for Rural WaSH, WaSH in Health, WaSH in Schools implies a wide range of institutional actors. In reality, it does appear a confusion on the roles and responsibilities.

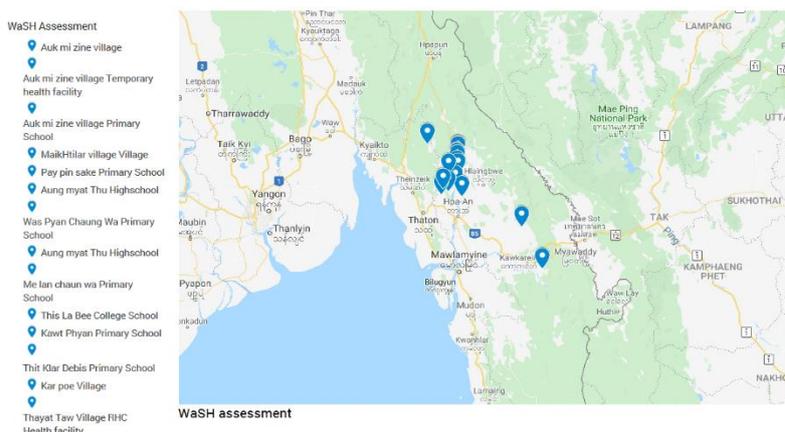
Figure 1 List of villages and health facilities assessed

	Where	State	Control	Individuals	Assessed Health facilities
1	Auk mi zine village	Hpa An	GOV/K NU#7	852	1
2	Maikhtilar village	Hpa An	GOV/K NU#7	600	/
3	Me lan chaun wa	Hpa An	GOV/K NU#7	180	/
4	This la bee/ Myit kyoe village	Hpa An	KNU#1	300	/
5	Kar Poe	Hpa An	GOV/K NU#7	300	/
6	Thayat Taw RHC (group of 5 villages)	Kawka reik	GOV/K NU#7	2321	2
7	An Pha Gyi	Kawka reik	GOV/K NU#6	580	1
			Total	5033	4

Figure 2 List of villages and facilities assessed

	Where	What	Town-ship	Control	Students	Teachers	Other
1	Auk mi zine village	Primary School	Hpa An	GOV/K NU 7	155	6	0
2	Pay pin sake	Primary School	Hpa An	GOV/K NU 7	60	2	0
3	Aung myat Thu	Highschool	Hpa An	GOV/K NU 7	340	23	
4	Was Pyan Chaung Wa	Primary School	Hpa An	GOV/K NU 7	50	2	0
5	Aung myat Thu	Highschool	Hpa An	GOV/K NU 7	340	14	1
6	Me lan chaun wa	Primary School	Hpa An	GOV/K NU 7	30	3	0
7	This La Bee	College School	Hpa An	KNU 1	35	3	0
8	Kawt Phyan	Primary School	Hpa An	GOV/K NU 7	49	4	0
9	Thit Klar Debis	Primary School	Hpa An	GOV/K NU 7	130	5	1
10	Kyone Kha Na	Primary School	Hpa An	GOV/K NU 7	120	3	0
11	An Pha Gyi	Secondary/ Highschool	Kawka reik	GOV/K NU 6	735	10	2
			Total		1914	75	3

Figure 3 Map of assessed villages and facilities



This might relate to the recent opening and structuration of services in the country, along with a variety of non-state actors whom have their own structuration and administrative boundaries. For instance, KDHW is in charge of WaSH in Health for some groups of KNU but not all. KNU#1 has its own MoH (Ministry of Health). In governmental controlled areas, Department of Rural Development and its Water Resources Department, MoH and MoE (Ministry of education) are in charge of WaSH in rural settings. In urban settings, the municipality is the key actor.

From PUI past experiences in the areas (Dala, Yangon, 2016 might be taken into consideration to some extent) and testimony from the field, community-based management for WaSH infrastructures is not common. One element of explanation may be there are more individual water supply solutions (open wells) rather than community (networks) which do not require community management, but solidarity. Successful experiences seem to require the following components:

implication of a leader in the community taking charge the maintenance when a breakage happens (with other elders or traditional leaders) and a stable community (past PUI experiences were less successful in area with major population movements). In some cases, monastery community commonly provide water free in public places, which is the case in Yangon but also in Hpa An town and rural areas.

⇒ **Water availability**

According to the National Strategy (National Strategy for Rural Sanitation and Hygiene (WaSH) – 2016-2030, Government of the Republic of the Union of Myanmar, 2016.), in 2030, 100% populations should be provided with 45 L/ pers./ day, including 5 for drinking and 40 for domestic uses with access <200m from the HH.

According to the assessment, **quantity water is quite enough in rainy season, bus is often lacking in dry season.** One have identified three coping strategies: fetching from the river, collecting water from neighbors or donation from monasteries. Quantifying an amount of total water available was not possible to assess during the mission due to the rainy season. The figure below shows how people interviewed feel about water quantity.

Table 1 “Do people have enough water” answers.

Where	State	Individuals	In rainy season	In dry season
1 Auk mi zine village	Hpa An	852	Yes	Yes
2 Maikhtilar village	Hpa An	600	Yes	Yes
3 Me lan chaun wa	Hpa An	180	Yes	Yes
4 This la bee/ Myit kyoe village	Hpa An	300	Yes	No
5 Kar Poe	Hpa An	300	Yes	Yes
6 Thayat Taw RHC (group of 5 villages)	Kawkaireik	2321	Yes	No
7 An Pha Gyi	Kawkaireik	580	Yes	No
Village	Population	In rainy season	In dry season	
1 Auk mi zine	852	Yes	Yes	
2 Maik Htilar	600	Yes	Yes	
3 Me lan chaun wa	180	Yes	Yes	
4 This la bee/ Myit kyoe	300	Yes	No	
5 Kar Poe	300	Yes	Yes	
6 Thayat Taw	2321	Yes	No	

Hereafter are the types of water supply according to the context: floodplains, in mountain and foothills and in urban settings.

In the floodplains:

- **Open shallow wells:** It is not rare to note 20+ wells in a villages, which means <50 people/ well, sometimes in each household. They sometimes have wide diameter (> 4m). Approx. half of them dry in low water season. Open wells are used both for drinking and domestic purpose.
- **River/stream:** surface waters are widely present in all areas. Salween River and its tributaries Gyaing and Donthami Rivers are a major resource. They are used both for drinking and domestic purpose. In all assessed villages, people mentioned the population get their drinking water from the river in dry season. National 2014 census estimates 7.2% of Hpa An and 5.6% of Kawkekreik population drink river water as a main source.
- **Deeptube wells/ boreholes:** Mostly found at institution level, the quality is low (type of equipment and quality of material). Common depths are between 30 to 100m and maximum yield is about 5m³/h. They are used both for drinking and domestic purpose. The national 2014 census estimates 5.6% population in Hpa An and 2.4 in Kawkekreik use this source for drinking.
- **Water harvesting** rainwater is harvested through bamboo, leaves or iron sheets roofs and is only used only for domestic purpose.

In the mountains and foothills

- **Springs catchment:** most of the time, rainwater is caught/ harvested along to the hills. Rainwater is collected in storage tanks. One site visited (monastery) repress harvested rainwater to the top of the hill in dry season. Many sources are sustainable and of great water quality. This water is used both for drinking and domestic purpose.
- **Water harvesting** from houses roofs is also a common practise.

Contrary to many other parts in Myanmar, ponds are not common in Kayin state. The reason may bethe surface water is widely present.



Open wells are of low quality work, either with concrete rings or bricks. Household wells most commonly do not have gravel par neither apron. This la bee village, Hpa An township, Kayin.



Catchment



River crossing



Laying pipes. Design, works and quality of equipment of the catchment and piped system is of low quality. This spring catchment constructed in NGCA in 2017 has been supplying a school for one year only. This la bee village and Karen College, Hpa An township, Kayin.

In Urban settings

Hpa An township counts 161,457 people of whom 14% live in rural settings. Kawkaireik townships counts about 96,066 people, of whom 18% live in rural settings. This assessment was conducted in Hpa An town only.

- **Water bottles** are widely used for drinking purpose in urban settings in Hpa An, with 60% of the population using bottled water bottled water for drinking purpose (and 30% from protected wells). At least 5 bottled water factories were identified in Hpa An.
- **Rainwater harvesting** is widely used for domestic purpose in rainy season, replaced by piped networks during the dry season.
- **Municipal water network** has its intake is in Salween River and connect HH downtown (each HH has its water meter). This water is not for drinking purpose and the network but is only supplying water in dry season. Suez Company has an ongoing project for water supply in Hpa An but no more details are available at this point.
- **Monastery water network** has its intake is in Salween River and feed community water tanks downtown during the dry season. This water is free for users.
- **Open wells and deep tube wells** are widely used in HH of hotels, institutions. Water is for domestic purpose only.

⇒ Water quality

According to the National Strategy, the standard of water quality water should be free from odour and colour, with turbidity less than 5 NTU. (Nephelometric Turbidity Unit)

At Kayin level, 36% of sources of drinking water are not improved (2014 National census. Kayin state report. Ministry of Immigration and population, 2015), versus 30% at national level. Here below are listed the main sources of drinking water. On the assessed locations, one noted only unimproved sources as main source of drinking water (Table 2).

The main findings of the assessment show that water quality is the major issue in the area, corroborated by authorities (Interview with Dr Sue, KDHW. Hpa An, August 2019) and confirmed by observation, interviews and water quality analysis. In theory, out of the technical solutions, deep tube wells, spring catchment and water networks are supposed to be safe. In reality, in this context, these types of supply are not safe. The major reason is the low quality of works and the lack of protection of water points toward potential contamination. Although, the 2014 census identify that 55.1% of drinking water comes from protected well/Spring for Hpa An and 59.8% for Kawkairek, this has to be taken with precaution since most of water points observed during the field mission are open wells not properly functional/made and with a risk of contamination.

Table 2 Type of main source of drinking water

Improved sources	Kayin level (2014 Census)	Assessment Findings		Unimproved sources	Kayin level (2014 Census)	Assessment Findings
Tap water/piped	5%	/		Unprotected well/spring	17%	for 6 out of 7 villages
Tube well, borehole	4%	/		Pool/pond/lake	1%	/
Protected well/spring	44%	/		River/stream/canal	11%	for 3 out of 7 villages in dry season
Bottled/purified water	12%	/		Waterfall/rainwater	4%	for 1 village
TOTAL Improved	64%	/		Other	3%	/
				TOTAL Unimproved	36%	/

Water quality and risks of contamination

Field water analysis and interviews underline the following findings:

- **Bacterial contamination:** visible in all analysis, except from springs.
- **Turbidity:** Not a major issue from field analysis, but from visual observation and testimony, this is a common issue, especially in dry season. Turbidity has an effect on bacteria development and chlorination efficiency.
- **Iron (Fe) and Manganese (Mn)** are commonly found in groundwater and impact taste and colour and therefore on the acceptance from the populations. There is no risk toward health at found concentration though.
- **Arsenic (Ar):** concentrations of 50 mg/L (WHO limit : 0.01mg/L) for yields of 4m³/h have been found by Peace Winds Japan in Kayin in Thanintharyi. In the country, some concentrations above 150mg/L would have been found in Kachin (KII, personal notes) and SI confirms its presence in Rakhine. Long-term exposure to Ar can cause cancer and skin lesions. No solutions have been yet found locally to treat Ar.

The table below presents the results of the water analysis realized during the mission.

Parameter	Open well Me Lan Chaunk Wa school	Open well Head of village Maikhtilar village	Spring water This la bee/ Myit kyoe village	Well Pha Gyi vilage	Deep tube well Thayat Taw health facility
pH	6,2	5,3	6,7	6,1	6,3
Conductivity ($\mu\text{S}\cdot\text{cm}^{-1}$)	106	113	13	117	115
TH (mg/L)	1,4	3,4	1,1	3,6	2,2
TA (mg/L)	0	0	0	0	0
TAC (mg/L)	1,2	2,2	2	4	2,5
Iron (mg/L)	0,1	0,12	0,04	0,34	0,34
DCO (mg/L)	2,74	5,1	1,5	5,1	3,4
Turbidity (NTU)	3,4	3,9	1	1,2	4,8
Bacteriological flora (FCU/mL)	1,000	10,000	<1,000	10,000	100,000
Comment	Low risk toward health	Rain water contamination. Medium risk toward health	Good quality	Rain water contamination. Medium risk toward health	High risk toward health

Interpretation of these analyses underline:

The type of infrastructure do not prevent from contamination

Open wells are often contaminated by rainwater, which emphasize a low quality of protection/ realization of infrastructures.

Spring water are of great potential for drinking purpose.

The risk of contamination is underlined thereafter:

- **Open shallow wells**

Most of the time made by the household itself or unskilled workers, quality of construction is low (except rare cases) but mainly, there is no apron, nor protection, nor gravel pack, nor drainage. Quality of concrete is an issue leading to breakage of aprons. Sometimes, bricks made wells are not plastered. Open shallow wells are the most common source of water.

- **River/stream**

Salween River is one of the most polluted river in the world. Rivers and streams drain water from upland areas. Moving waters dilute and decompose pollutant more rapidly than standing waters, but many rivers and streams are heavily contaminated due to industries e.g. cement industry leading to suspended matters, propitious for bacterial development, agriculture with pesticides in rice fields and domestic, linked to the lack of sanitation.

- **Deep tube wells**

This technic is supposed to be safe regarding water quality and protection toward contaminants. However, most of the deep tube wells are about 30m deep only and catch altered rock rather than fractures. Therefore, this does not prevent bacteriological and physicochemical pollution more likely in shallow aquifer (contamination by sub-surface flows). The main issue is still the type and quality of works. Neither geophysics (resistivity measures), nor proper equipment (gravel pack, bentonite or clay, cementation...) nor pumping test are completed according to typical hydrology standards. Drilling proper boreholes would be preferable in order to improve water quality.

- **Water harvesting**

Rainwater harvested from roofs is not safe for drinking and populations do not use it for drinking purpose.

- **Springs catchment**

Springs have the only safe water from this assessment.

- **Water bottles**

Water quality of bottled water is suspicious. The written treatment visible on some bottle labels in Hpa An, Kawkereik and surroundings do not make sense technically. For instance, there is no point to treat water with UV + ozone + ultrafiltration after a reverse osmosis treatment. Unfortunately, the assessment team could not visit the factories. In Kawkereik, the health personal suspect bottled water makes people sick.

- **Municipal and Monastery water network**

From available information, there is no treatment of the pumped water. Raw water from Salween River is used. However, interviews show this water is not for drinking purpose.

Treatment

The assessment team have noted the following treatments during the mission:

- **Decantation:** in urban settings, this is a common practise observed for pied water at HH level. Users first supply decantation tanks and wait up to one day for suspended matters to decant. This water is not for drinking purpose though.
- **Boiling:** in rural settings, population drink water from wells and river, springs, most commonly raw, but boiling is a common practise.
- **Filtering:** *In rural settings, HH often use cooking utensil for water filtration, this method is only efficient to remove solid components in the water such as leaves, branches.*

Lifestraw community is supported by government/ UNICEF and available in some schools.

Some organization donated Sawyer mini filters and adapted on buckets in schools (see chapter WaSH in School).



Example of HH water filter. This item only removes solid matters.

⇒ Sanitation and hygiene

Excreta management

According to the national strategy, in 2030, each HH should have access to an improved latrine (own or shared) and 90% of them should have handwashing facilities.

In Kayin, 24.5% of the population still do not have access to a toilet, versus 14.36% at national level. In rural settings, the ratio of people who do not have access to toilets estimated is 23% in Hpa An district (versus 2% in urban) and reach 30% in Kawkerekik (versus 4% in urban) (source: national 2014 census). Focus groups discussions and field observations also underlined of a huge gap in terms of sanitation. In NGCA or mixed controlled areas, KDHW estimate about 70-80% do not have access to a toilet. Even though quantifying access to HH sanitation was not possible to estimate during this mission, the team noted important differences between governmental and non-governmental areas. The main reasons identified may relate to differences in access to education, supplies, access to health personal and hygiene projects (government, NGOs). It is important to underline that even though HH have access to sanitation, it is still common for people to defecate in the open. The table below shows the estimated presence of toilets at HH level, and the type of toilets at state level (2014 Census).

Oxfam GB piloted Tiger worm toilets in Shan, in a similar context regarding population density, access and soils. Main findings are:

- interesting technical solution to reduce sludge volume where water table is high
- Challenges to get worms (only one supplier in the country)
- Need of awareness of users, since there is reluctance to use toilets regarding the presence of worms in the pit.



Example of primary school latrine with handwashing station, Aung myat Thu school, Kayin.



Household latrines are mostly made of bamboo, leaves, wood or iron sheets.. They are poor flush toilet type..



Even though construction is basic and often non-safe toward environment (unsealed pit lead to a risk of fecal-oral contamination through flies and surface contamination in the event of flooding), the inside is most of the time clean and cleaning material is present. This la bee village, Hpa An township, Kayin.

	Location	Pop	Estimated No toilet during the assessment	Type of toilet	Kayin level (2014 Census)
1	Auk Mi Zine Village	852	A few	Flush	1,4%
2	Maikhtilar village	600	Half	Water seal (Improved pit latrine)	67,5%
3	Me LanChaun Wa	180	A few	Total Improved Sanitation	68,9%
4	This la bee/ Myit Kyoe Village	300	Half	Pit (Traditional pit latrine)	4,8%
5	Kar Poe	300	A few	Bucket (Surface latrine)	1,0%
6	Thayat Taw Village RHC	232	Almost none	Other	0,8%
7	An Pha Gyi	580	A few	None	24,5%

Estimated sanitation and open defecation coverage

Type of toilet in Kayin (2014 census)

The mission team noted the following technical solutions, per setting:

	User interface	Collection and storage/ treatment	Conveyance	Use/ disposal
Urban	Pour flush toilet	Septic tanks Conventional gravity sewer (tbc)	Sewer (tbc)	River/lake (tbc)
	Cistern flush toilets			
Floodplains	Pour flush toilet	N/A	N/A	Fill and Cover
Mountains	Dry toilets	Single pit	N/A	Fill and Cover
Institutions	Urinal (in schools and municipal toilets)	Single ventilated pit	Motorized emptying and transport (municipal septic tanks)	Soak pit
	Pour flush toilet	Septic tanks (municipal toilets)		

According to the national strategy, villages should be free of open defecation in 2030.

Even though toilets are present in HHs, open defecation is still a common practise in the assessed area. In most of the villages, with or without toilet, almost everyone still go to defecate in the open. In such cases, users may use water, leaves or ground for cleaning and handwashing rather than soap and water. However, when toilets are at HH level, there is always water for cleaning and handwashing, often with soap. In a surprising way, even when external appearance of latrines is rudimentary or non-safe for the environment (same reasons as mentioned above), inside, the toilets are most of the time clean and include soap for handwashing, brush and broom (see picture above).

Solid waste management

According to the National Strategy for Rural Sanitation and Hygiene, solid wastes have to be either, composted, recycled and residual waste to be safe disposed.

In urban settings, the municipality organize waste collection and transport to a landfill. Although the assessment team did not assessed the urban waste channel, it identified:

- Absence/poor use of Personal protective Equipment (PPE)
- Rainwater networks plugged by solid waste.

In rural settings, wastes are visible around shelters (plastics, steel containers, organic wastes). Commonly, HH collect aggregated waste, then throw them in ditches in the open ground and burn them.

Solid waste are mosquitos breeding sites and need management in order to limit malaria and dengue, two of the main diseases in the area

Rainwater and drainage

The national strategy does not emphasize rainwater and drainage, except for wastewater in health care facilities.

Two weeks prior to the assessment, Mon and Kayin faced important floods and landslide and counted 50+ death, and 73+ missing persons (Main visible wastes in HH are made of plastics, steel containers, organic wastes). Government, non-state actors and communities responded to this emergency.

Based in the floodplains, Karen build their typical houses on stilts sometimes reach several meters high. Those are resilient to floods. However, institutions facilities are mostly classically build and floods threaten the facilities (see picture on the right). Technical solutions for drainage are required and easily doable to sustain facilities, at local level.



Erosion due to lack of drainage in a schoolyard may soon threaten infrastructures

Kawkereik, Kayin

⇒ WaSH in Schools

Water supply

According to the Myanmar National Strategy, in 2030, 11 liters per day and per students and per staff are necessary, which includes 1 L of drinking water, 5 L for cleaning and handwashing and 5L for toilet flushing.

Despite data of number of schools in NGCA was not available during the assessment, according to the UNICEF, there are 260 government schools in Kayin state. Out of the few assessed **none of the students or teachers have access to protected source of water at school level.** Most of the time, students and education personal rely on open wells and rivers for drinking, whereas harvested rainwater is the water source for domestic purposes. The table below shows the type of water supply for each facility.

	Where	What	People ¹	Open Well	Rain water harvesting	Open well + piped network	River
1	Auk mi zine village	Primary School	161		√	√	
2	Pay pin sake	Primary School	62	√	√		
3	Aung myat Thu	Highschool	363		√	√	
4	Was Pyan Chaung Wa	Primary School	52	√	√		
5	Aung myat Thu	Highschool	355		√	√	
6	Me lan chaun wa	Primary School	33	√			√
7	This La Bee	College School	38	√			√
8	Kawt Phyan	Primary School	53	√	√		
9	Thit Klar Debis	Primary School	5				√
10	Kyone Kha Na	Primary School	123	√	√		√
11	An Pha Gyi	Highschool	735	√	√	√	√

Drinking water source VS Schools assessed

UNICEF distributed Lifestraw community filters (<https://www.lifestraw.com/products/lifestraw-community/>), to the in schools. They have a great acceptance. This solution is adapted when proper infrastructures are missing.

Some community-based organizations distributed Sawyer mini filters (<https://sawyer.com/products/mini-filter/>) to some schools. These filters were adapted on buckets, which is not the regular way to use them. Acceptance is not good because yield is not enough with this use. This solution is adapted for HH.

Sanitation and hygiene

According to the national strategy, in 2030, schools should have one-toilet cubicles / 40 students, 1 urinals / 40 boys, a specific toilet cubicle for female staff, with accessibility for girls with disabilities (staff toilets at primary level may be combined for male and female, depending on the number of staff) and 1/ male staff with accessibility for boys with disabilities. Schools should have a hand washing facilities / 40 pupils and a special room for girls for menstrual hygiene management for middle and high schools.

According to this standard, 6 out of 11 assessed schools fit the requirement in terms of number of toilets, 4 in terms of sex segregation and only 1 is disables friendly. Open defecation has not been observed around latrines, but from interviews, children go to the bush or to the river to relieve themselves. The table below shows the coverage of sanitation /handwashing installation per facility.

Hpa An UNICEF office and CDA (Community Development Association) are developing plans of institutional latrines in schools, people with disability and gender friendly, handwashing station and water supply technical standardized designs and bills od quantities with government officials.

According to the national strategy, in 2030, all school will have access to appropriate waste disposal.

In the field, none of the school has a safe waste disposal. Pit in the open ground where waste is burned in dry season is the only system observed.

8 out of 11 schools had proper handwashing stations. However, none of the girls toilets in secondary /high schools, had material for menstruation (at least a bucket), but An Pha Gyi school, Kawkareik Township, Kayin.

In schools, Hygiene promotion is always part of the life skills program. Most of the schools have posters provided by the government, UNICEF and/or WHO.



In schools, health facilities and villages, educative posters are founded everywhere. However, it seems carried out and maintained by NGOs. Dilapidated hygiene promotion posters. Kone Kya Na village, Hpa An township, Kayin.

	Where	What	Students	Teachers	Other	Required toilets	Estimate toilets	Handwashing stations	Segregated by sex	Disabilities friendly
1	Auk mi zine village	Primary School	155	6	0	5	6	3		
2	Pay pin sake	Primary School	60	2	0	3	2	1		
3	Aung myat Thu	Highschool	340	23	0	11	17	9	√	
4	Was Pyan Chaung Wa	Primary School	50	2	0	3	6	8		
5	Aung myat Thu	Highschool	340	14	1	11	6	3	√	
6	Me lan chaun wa	Primary School	30	3	0	3	2	1		
7	This La Bee	College School	35	3	0	3	6	0		
8	Kawt Phyan	Primary School	49	4	0	3	2	1	√	
9	Thit Klar Debis	Primary School	35	3	0	3	2	1		
10	Kyone Kha Na	Primary School	120	3	2	4	4	1		
11	An Pha Gyi	Secondary/ Highschool	735	10	2	20	22	11	√	√

*“ In 2008, UNHCR installed a well with a pump in the health facility, but water is not good for drinking. Instead, we rely on bottled water, but this water make us also sick, my family and my patients”
H. L, 40yo, 2 children.
Thayat Taw, Kayin.*

⇒ **WaSH in health care facilities**

Water supply

According to the national strategy, in 2030, all hospitals should have 30L/day/ inpatients, 20L/day/ outpatients and 20 L/ patient/ day in rural Health facilities / sub health centres.

DHW only has 74 health facilities (rural health centres types) in Hpa An. The overall population (NGCA+GCA) is about 161,457 people. Data from government and other non-state actors or Kawkareik was not available. During the assessment, only 1 out of 4 assessed facilities seemed to have safe access to water (brand new UNOPS funded facility). Water quality is a major issue noted by the medical staffs, and when bottled water is the only source of drinking water, safety is doubtful. Health workers request support from PUI in terms of water quality. The table below shows the type and estimated water supply per facility.

Where	Type	Pop.	Patients/ day		Drinking water supply		
			Out	In	Open well	Deep tube well	Bottled water
Auk mi zine village	Rural health facility	4170	2	1	√		
Thayat Taw Village RHC	Rural health facility	2321	7	3		√	√
Kawkareik	Rural health facility	3000	7	10		√	
An Pha Gyi	Rural health care facility	480	3	3	√		

Sanitation and hygiene

According to the national strategy, in 2030, rural health centres should have latrines, handwashing facilities, wastewater treatment systems and clinical and hazardous waste disposal.

The table below shows the sanitation installation observed in the facilities. All assessed health facilities have toilets, but quantity was not enough and quality of infrastructures is variable. None of the assessed facilities fit with national standards with a proper waste disposal for clinical and hazardous wastes. Only a brand new facility, UNOPS funded has a great sanitation and hygiene level of services.

For general and medical waste management in health care facilities, pit in the open ground is the most common technic, with no protection nor segregation. From interview with KDHW, even the state hospital does not have incinerator. **The risk of contamination of children by sharp wastes is a high risk identified in health care facilities**, as in all visited facilities, health personal live with their families. Also, the water table was noted between 0 to 8m under ground level in the floodplains. The risk of aquifer contamination is therefore also high. In the brand new UNOPS funded facility, even though infrastructure was optimal, with incinerator and concrete pit, wastes were founded all mixed in the incinerator, which shows a need for capacity training and monitoring on software components along to infrastructures building. Although brand new, the management of the incinerator seems yet a challenge.

Where	Type	Pop.	Patients / day		Toilets		Waste management
			Out	In	required	Estimated	
Auk mi zine village	Rural health facility	4170	2	1	2	1	Pit in the open ground
Thayat Taw Village RHC	Rural health facility	2321	7	3	2	1	Incinerator/ Concrete pit
Kawkareik	Rural health facility (Unops)	3000	7	10	2	2	Pit in the open ground
An Pha Gyi	Rural health care facility	480	3	3	2	1	Pit in the open ground

⇒ **WaSH in camps**

In 2018, TBC (The Border Consortium) estimates 162,000 IDPs the total number of IDPs in South East Myanmar (49,800 in Kayin state), out of whom were displaced 5,630 people during the past 12 months (3,630 due to conflict and 2,000 due to natural disaster). About 13,270 of them are located in four IDPs camps in Kayin (2018 Annual report. The Border Consortium and KII, personal notes). The following table showing IDPs figures (right) may exclude settlements that did not come out of this assessment and is therefore indicative:



A midwife and her son, living in the health facility. Just behind, an open pit full with medical waste in and outside the pit, including sharps. Children play around. Kyone Kha Na village, Hpa An Township, Kayin.

Township	District	Refugees (2013)	IDPs (2012)	IDPs Camp	Location	Individuals
Hpa-An	Hpa-An	9714	0	Ee Tu Hta	Hpa Pun township	2 570
HlaingBwe	Hpa-An	16841	5000	Myaing Guy Ngu	Hlaingbwe township	5 200
HpaPun	Hpa-An	12955	41000	Aye Thu Ta	Hlaingbwe township	2 500
Thandaung Gyi	Hpa-An	743	16000	Mae Tha Waw	Hpa Pun township	3 000
Myawaddy	Myawaddy	927	4150		Total	13 270
Kawkareik	Kawkareik	8107	2300			
Kyarinseik Gyi	KyarinseikGyi	4760	20700			
Total	54047	89150				

Left : Refugees and IDPs in Kayin (UNHCR Kayin's Profile, 2014); right : some IDPs Camps figures in Kayin

From interviews, there is no willingness for return due to a heavy landmine contamination in the area and since most of IDPs do not have IDs. Living conditions in these camps are quite harsh and access is highly restricted. The main concerns are the gaps in shelters and WaSH. For instance, in Myaing Guy Ngu camp, there is only one deep tube well for the whole camp. At the time of the assessment, there is also a gap of WaSH technical human resources in Kayin even though gaps are there and emergency needs are huge in camps and offsite in Hpa Pun.

This analysis does not include refugee camps located in Thailand (97,577 people in 9 camps), but it's interesting to note that about 3,481 returned to Myanmar in 2018

Logistics and markets

⇒ Equipment and material

Most of the necessary supplies are available in the area, either in In Hpa An, in Kwakareik or in other major towns and other main locations. In all assessed location, population has access to the market. The main concern is the quality of items. For instance, there is no PEHD (Polyethylene High-density) pipes, unless to buy from Yangon. Same concern for solar panels widely spread out but of low quality. In Yangon though, great quality of supplies should be available. Supplies are also doable from Thailand, which is an opportunity in the southeast.

⇒ Services providers

For desludging, in urban areas, one identified one service provider, for a cost about EUR 300 per m³ (100,000 kyats / drum (52 gallons), price for Hpa An town). In rural areas, desludging is not common. In communities, HH build new latrines rather than desludging (latrines, made out of local materials and there is no issue of space). Institutions officials told they sometime go for mechanical desludging. Sludge is spilled in the environment.

For well digging, HH do their own wells with concrete rings available anywhere on the main roads. The assessment did not identified well digging company with skilled workers in the area, although open wells are the most common technical solution for water supply.

For deep tube well/ borehole drilling there are a few contractors in the area. Available drilling methods are: slugging, cable tools, rotary, reverse circulation, down the hole hammer, bucket drilling machine, auger kit, driver well point method and water jetting. Maximum depth is up to 60m (200 feet). Maximum yield are <4m³/h. Price for drilling is about kyats 5M (EUR 3000) for PAT drilling machine. PAT drilling machines are about M15 (9,000 EUR). Companies do not invoice for negative boreholes, up to three tests. Peace winds International proceed to 15-20 wells/ year and gravity flow system but are more experienced in dry zone (since 2013). Their hydrogeologist, based in Hpa An provide training to government staffs. No geophysics, but electric logging during drilling is used. Peace winds proceed to a one-step pumping test on 2 hours. Supplier of boreholes with bigger equipment are available in Yangon.

Electricity, phone and internet coverage: electricity coverage from main line is about 5% of the villages assessed. Most HH and institutions rely on solar panels (china made and of low quality). Phone coverage estimate in the population is 30% and internet coverage is about 80%, but in most remote areas (especially NGCAs). An electrification project along the main roads is ongoing, but there is no clear timeline and available plan. Some pole and wire have been set up in some locations since few years with still no electricity.

Finance services: people do use banks and move from villages to towns to have access to finance services.

⇒ Roads conditions and transportation

The is the major issue for logistics is road/ tracks access in rainy season. Most of the villages were not accessible during the assessment because of it. Public transportation do exist but only link the main towns. In remote villages, people have their own cars or motorbikes and rely on solidarity to join the main localities to reach public transportation.

During the assessment, time spent on the road from Hpa An were up to 6 hours one way.

For future projects in hard to reach areas, staffs will have to overnight closer to the projects locations. WaSH projects will have to be plan in dry season, between Sept-Oct. to April-May.

Constraints and opportunities

Constraints – Physical access

- No access to most of the areas in rainy season
- Security and administrative reasons: Travel Authorization are necessary for all areas in NGCA. Approval from Non-state actors and government is a prerequisite for access to areas through NGCA.
- Access of drilling machines in remote areas.
- Population density is not so high in Kayin, but they are vulnerable and hard to reach.
- On camps, suspicions toward INGOs threaten physical access. Some camps need access from cross border from Thailand .
- Landmines contamination and active fighting in Hpa Pun and around the camps.

Constraints – Access to data and evidence building

- Difficulties to get data from non-state actors because of lack of information or confidentiality.
- Evidence is not easy to build due to the lack of access of population to health services in hard to reach areas and the lack of information sharing in the different administrations.

Funding opportunities

Even though main of humanitarian funding goes to Rakhine and Kachin, some opportunities are noted as a first step :

- UNICEF is interested to partner with INGOs for WASH in camps and emergency WaSH in Hpa Pun, including WaSH in School and WaSH in health care facilities. A call for tender will soon be launched for small scale sanitation in Myaing Guy Ngu IPDs camp.
- UNHCR may have residual funding by the end of 2019 for small scale WaSH projects.

Coordination opportunities

Here below are a few coordination opportunities:

- KDHW, PUI historical implementing partner in the area is willing to collaborate and request for support in WaSH.
- Coordination with the government is an advantage in Kayin compared to other states.
- WaterAid is willing to develop their activities in South East, especially Kayah state. It has experience in collaborating on information management system with the government in Yangon. This methodology, once approved, might be scaled up in South East. This methodology will be useful to support authorities to design WaSH baselines.
- ACF do WaSH in Nutrition in Kayah, which may be an opportunity for potential coordination, as contexts are similar.

Recommendations

Long term WaSH strategy

⇒ Foster coordination between state and non-state actors

One of the main findings in this assessment is the difference of services in GCA and NGCA. NGCA areas are disadvantaged in terms of access to services in general, regarding the quality of infrastructures, but also access to WaSH (but also Health, Education for instance). Setting up and reinforce existing platforms of exchange will be beneficial. In this framework, one can already propose the following topics:

- **Set up harmonized baselines:** information on WaSH services in NGCA is a major gap for development planning. As soon as there is no clear picture of the situation over the state, there will not be any adapted strategy in NGCAs. From the present findings, the national WaSH strategy may not be entirely adapted for NGCA context.
- **Foster monitoring:** UNICEF is starting coordination in South East, since 2018 (following major floods), as a sector. Monitoring of the projects is an opportunity to put focal persons (of the multiple ministries) around the same table.

⇒ Improve and monitor water quality

Water quality issues are one of the main findings underlined in this assessment. Working on water quality may take a wide range of technical solutions. For instance:

- Support the development of a **water analysis laboratory at state level**. This is a gap widely shared by WaSH actors in the area (UNICEF/ DRD/ partners).
- Support existing treatment and agreement in **bottled water factories**
- Support **boreholes drillers and well diggers** in capacity building and equipment
- Scale up **access to sanitation** (CLTS, "Thant Shin Star" approach (adapted from the global "Three Star Approach for WASH in Schools) in schools, medical waste management in health care facilities...).

⇒ Ensure maintenance and sustainability of infrastructures

Maintenance and sustainability of infrastructures is one of the major findings underlined by this assessment. To support and encourage maintenance, one can relate some examples of actions:

- Promote an **approach "Village"**. This integrated approach should have the double advantage to improve projects efficiency towards health - by targeting specific communities - and to gather population from a same location around a common project (micro-networks) which fit the national strategy (Water Village Committees).
- Promote **beneficiaries participation** by moving from humanitarian assistance to early recovery programming, which implies cost sharing, participation in the designs and works...
- Integrate **capacity building** in all components: borehole drillers, well diggers, health staffs, including drainage.

⇒ Support local WASH surge capacity

Local surge capacity of local actors is already great (government, community-based organisations).

However, there is a need to **support the new State Department of Disaster Management** at state level to structure and to include hard-to-reach areas, respond to huge **gaps in camps** and to better prepare population for **future emergencies** (conflict or climate risk).

AFD / Suez Foundation Proposals

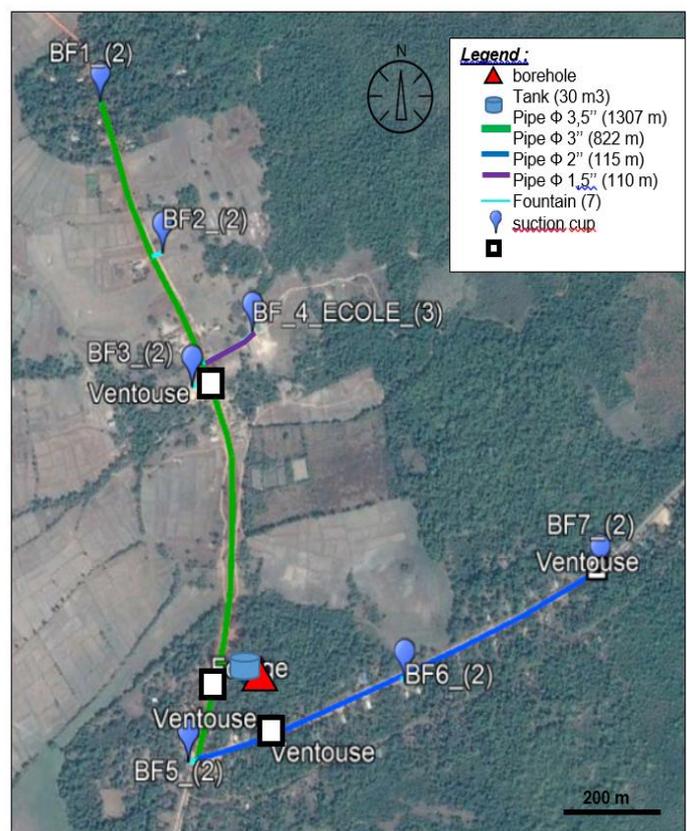
According to the initial version of the proposal, the technical options proposed for 2 schools and 3 Health facilities were hand dug well, rain water collector, water tank and tower, latrine construction (2 cubicles) and handwashing station.

Following the field visit, the assessment team propose the following adjustment:

- **Focus on a specific location** (village) to integrate WaSH and optimize the impact
- Prefer **protected sources of water supply** infrastructures
- This pilot will provide technical and software knowledge for scale-up programming.

The details of the proposed adjustments are (*Details of the project figure in Annex 5a et 5b in the full report*):

- Location : Pha Gyi Village, Kawkareik Township
- Beneficiaries : 480 inhabitants, including 1 primary school of 120 students (some from other villages and 5 teachers)
- Solution : village piped water system and sanitation block of 2 cubicles with handwashing stations for the school
- Total cost unchanged



Water supply scheme

Conclusion

To resume the main findings of this 15 days WaSH assessment in Hpa An and Kawkareik township of Kayin state, South Eastern Myanmar, here is what needs to be noted:

Peace process in Myanmar remains fragile in a context where population are facing significant gaps in terms of access to essential services and infrastructures

Population in South East face poverty (37%), major risks of climate risks such as floods, landslides, tsunami and a high range of criminality.

After 68 years of conflict, the country is still fragmented between multiple armed groups and administrations

Some parts of South East are facing emergency needs with about 120,000 IDPs in villages and more than 10,000 in camps.

However, with the structuration of the state and the recent improvements in terms of politics (a few groups still do not have cease-fires with the government) and humanitarian access, there are opportunities to work on recovery and long-term programming, along with surge capacity for emergencies. Whereas 99% of the humanitarian funding goes to Rakhine and Kachin states, where NGOs are numerous and access extremely limited, South East is accessible and population vulnerabilities are extreme.

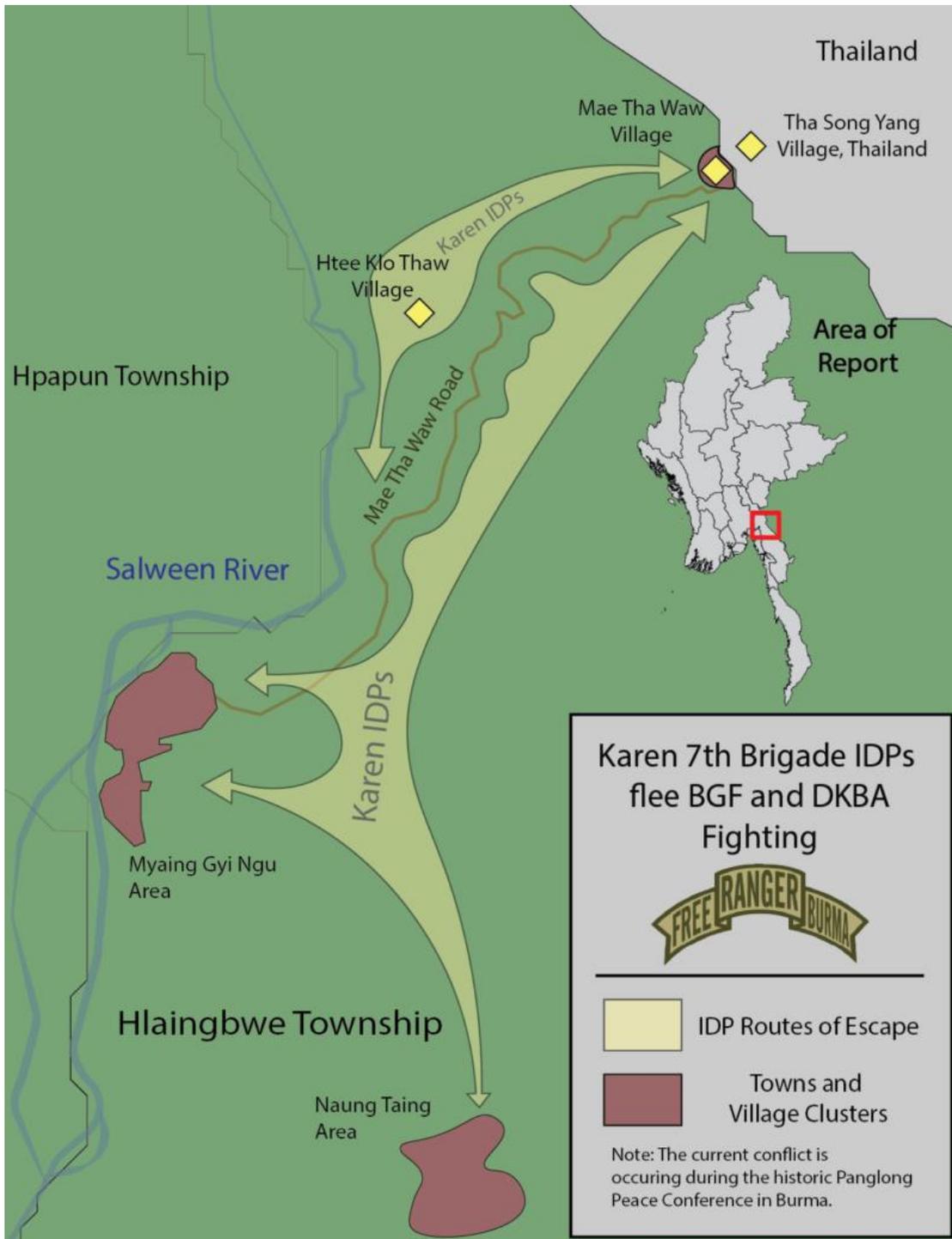
The main challenge identified is a two-speed development. On the one hand, a central government having a clear country strategy and achievable WaSH targets for areas under control. On the other hand, populations living under control of non-state actors (or mixed control), way backward, will not reach any target. Harmonization is therefore key for a long-term development in such a fragile and fragmented environment. This requires humanitarian actors to be flexible and to adapt their programming. Humanitarians shall involve the communities in the design of the projects and expert data collection must be well prepared to offer sustainable services.

Due to the limits of this assessment, further specific inquiries will be necessary in order to design specific projects, such as for IDP camps, urban WaSH or spring catchment and gravity flow systems which need further field investigations at the end of the dry season (April- May 2020).

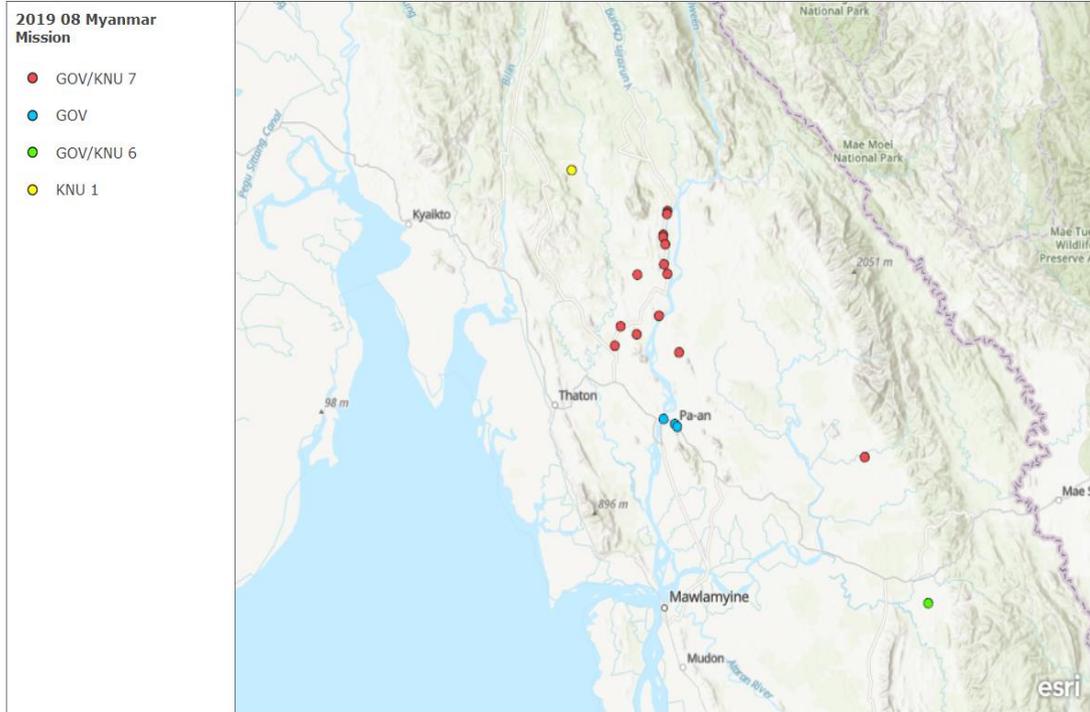




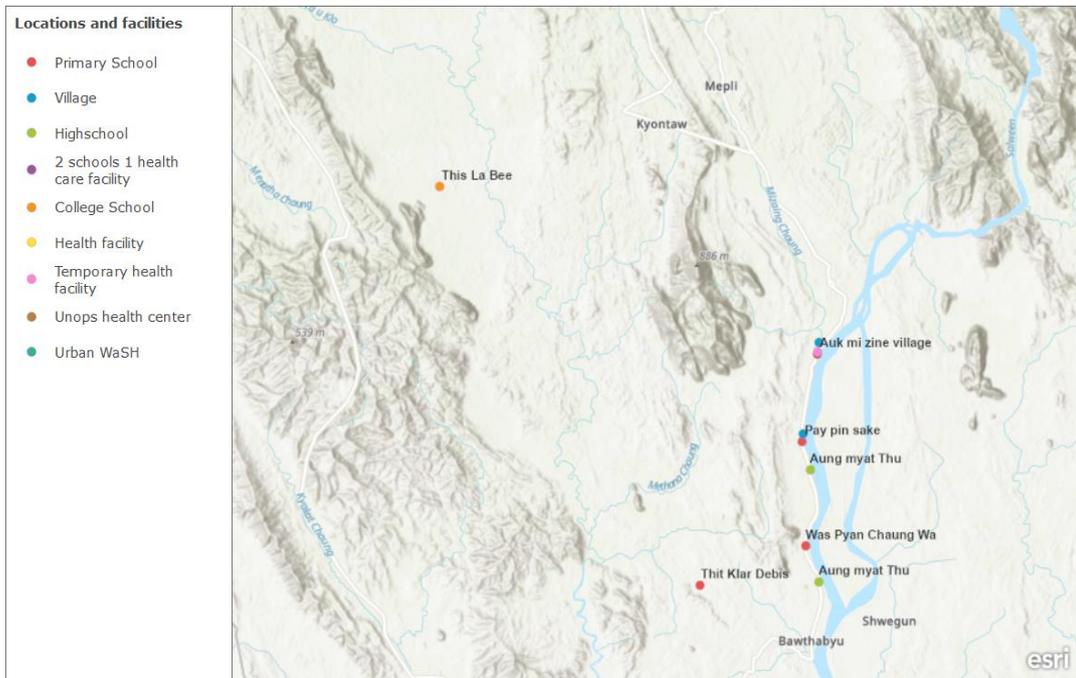
IDPs Camps in Kayin state (source: burmalink.org)



Assessed area VS control (government, KNU...)

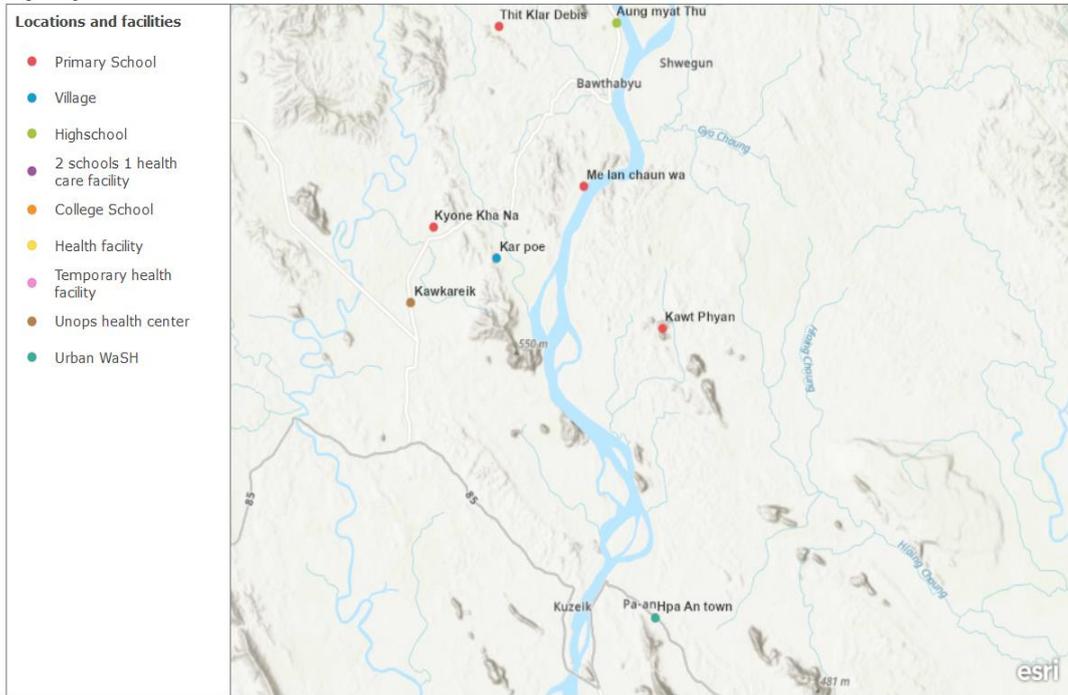


Assessed locations and facilities (North of assessment area)



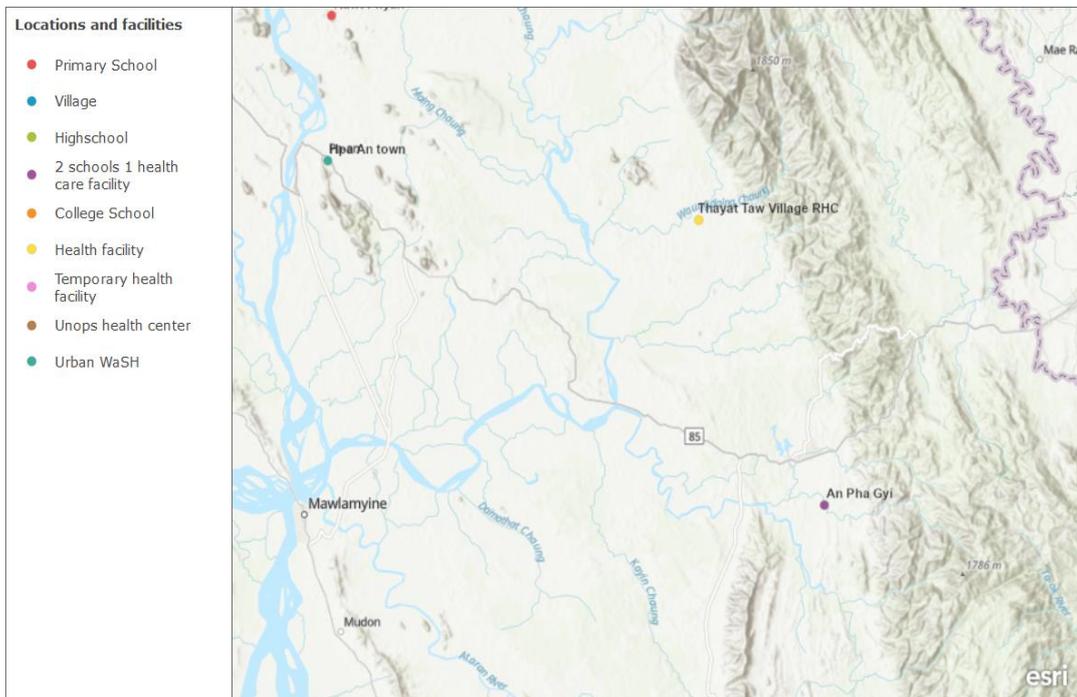
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Assessed locations and facilities (Central assessment area)



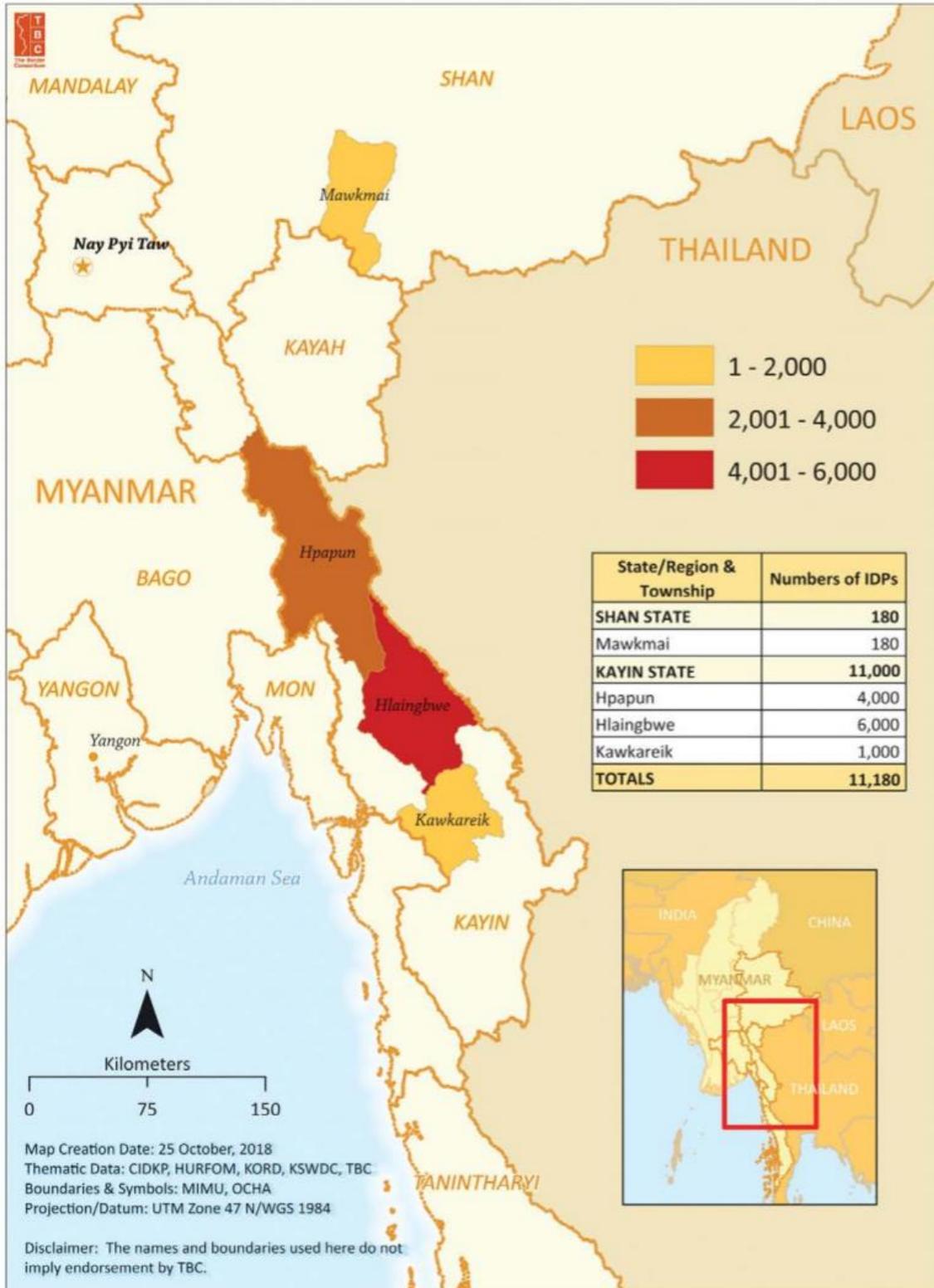
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Assessed locations and facilities (South assessment area)

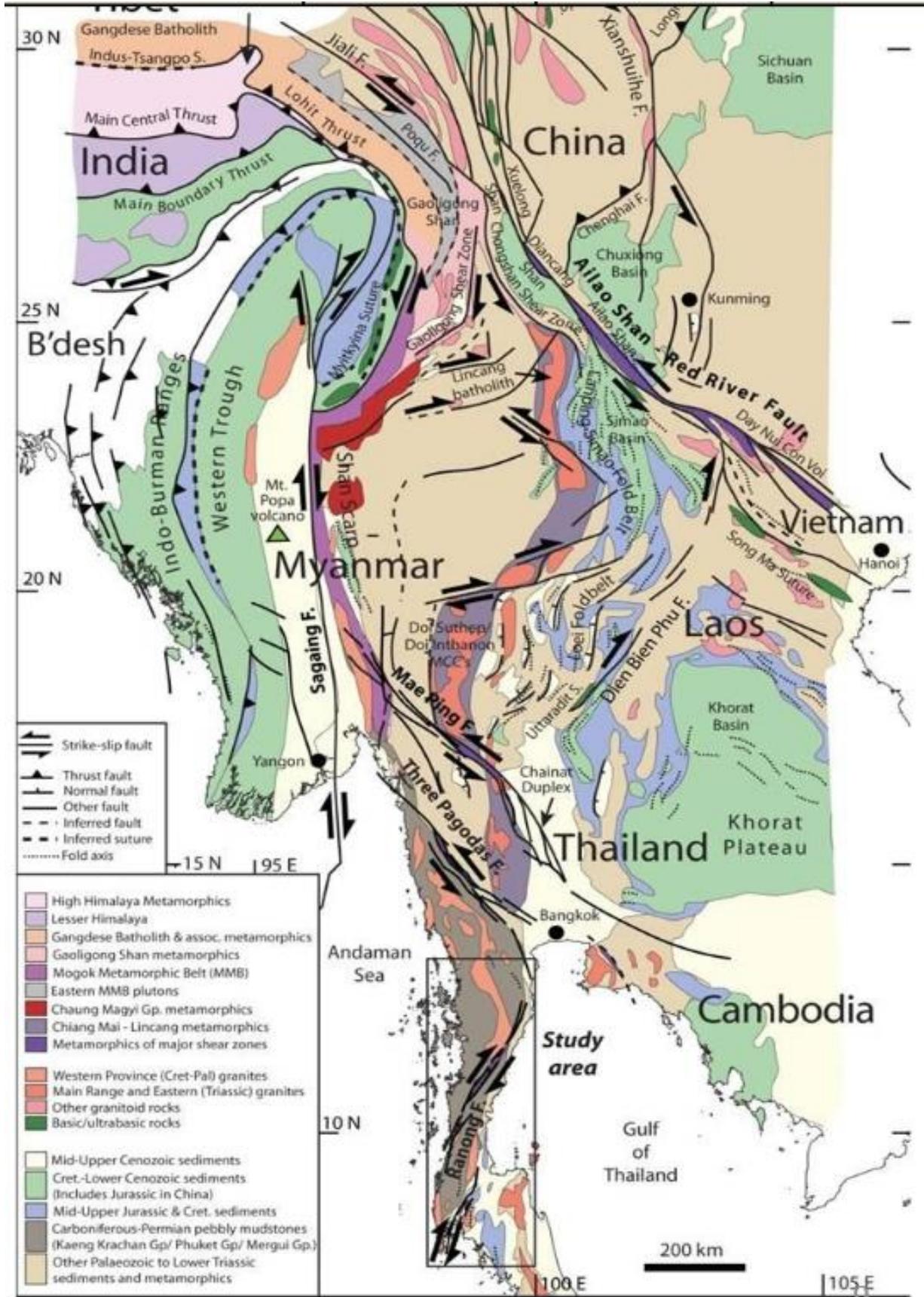


Esri, CGIAR, USGS | NOSTRA, Esri, HERE, Garmin, METI/NASA, USGS

Conflict induced displacements 2013-2018



Geological Map



Who	What	Where	Comments
Government			
Direction of Rural Development	WaSH in rural areas	Government controlled area and mixed controlled areas	From interviews and as per the national strategy, WaSH falls under multiple actors. These are the main interlocutors in our area of activity.
Ministry of Health	WaSH in Schools Provide list of RHCs and Sub-RHCs for WASH facilities provision		
Ministry of Education	WaSH in health		
Municipality	WaSH in urban areas		
Non states actors			
KNU health agencies	WaSH in health	Non-government controlled area and mixed controlled areas	KDHW is agency of the main KNU but not applicable to all (eg ; KNU1)
KNU – MoE	WaSH in school		
BGF	WaSH in health		
UN Agencies			
UNICEF	Coordination Direct WaSH activities implementation	In government areas, with direct support to the government In non-controlled areas, through local or international NGOs	UNICEF opened its office in S-E in 2018 and therefore are starting the coordination. Sector coordination, not cluster
UNHCR	Shelter support at IDPs camps including WASH-related facilities: water purification system and WASH facilities in Kitchen areas of Myaing Gyi Ngu IDP camps MRCS for providing gravity flow water supply system at villages	Kayin, Kayah and Mon states. Hlaingbwe township: - Myaing Guy Ngu (2 camps of 5,000 IDPs) - Aye Thu Ta : 2,500 IDPs Kyar Inn Seile Kyi Township	Main partner is DSW, MRCS
Private sector			
Drilling companies	>5 companies	South East	Very low quality of material and skills.
Bottled water factories	>5 factories	Hpa An Kwakeirek	Shady treatment process (often noted : ozone, Reverse Osmosis, UV, ultrafiltration which does not make sense) Was not possible to visit factories since they do not have government agreement
Suez	- Ils ont des contacts avec le revendeur KSB local. - Ils ont déjà pré sélectionné des sociétés de forage fiable. - Idem pour des conducteurs de travaux et BE. - Possibilités d'avoir des tuyau en PEHD sur Rangoon. - Il me confirme 2 gros projet de potabilisation de l'eau en cours et notamment sur PA HAN financer par la banque mondial.	Hpa An	
INGOs			
Phyu Sin Saytanar Action Group (PSSAG)	WASH program: - Construction of (25) new hand-dug wells, 150 latrines and other WASH facilities.	Hpa An and Kawkareik Townships.	Partnership with MOHS and KDHW.
Community Development Association (CDA)	Deep Tube wells drilling services at schools in	Kawkareik Tsp	Partnership with UNICEF, MOHS, DoE and DSW. Field office is in Kawkareik
INGOs			
Save the children international	Community development activities including education-related activities, school health and nutrition and WASH activities in schools.	Piped water supply in 90 villages (60 yet achieved) Handwashing facilities will be provided to 45 schools at 40 targeted villages	Main partners : DoE, MOHS and DSW Ask for support in terms of drilling

Malteser International (MI)	WASH in School and WASH in Community deep tube wells will be provided to rural health centres. 33 handwashing facilities, Page 3 of 6 8 latrines, 10 Overhead Tank and hygiene promotion	Hlaingbew, Paing Kyune and Hpapun Townships	partnership with MOHS, NTL+KDHW, KDN and Backpack Group
ADRA Myanmar	WaSH in school : 26 schools in the next 3 years	Hpa-An, Hlaingbwe and Kawkareik Townships	Partners are DoE, AEON and MOFA.
Norwegian Refugee Council (NRC)	(program closed) Under the school construction and shelter program, WASH facilities renovation is a component. humanitarian assistance in Camp for provision of WASH facilities such as pipeline installation, latrine renovations and personal hygiene awareness training.	Myaing Gyi Ngu Camp	WaSH programs Norway Ministry of Foreign Affairs Partnership with MOLIP, DDM and TVET
IRC	WaSH assessment in Myaing Gyi Ngu Camp (Minutes from WaSH coordination meeting Aug-2th, 2019)		Along with UNHCR and UNICEF
Peace Winds Japan (PWJ)	Tube well drilling Gravity flow water supply School handwashing facilities Technical training to government for drilling technique, solar panel installation and water chemical knowledge. Personal hygiene-related training and health service to school children (4-Cleans and Dental Health Services).	Hpa-An and Kyar Inn Seik Kyi in Kayin and Mon state	Partnership with the Department of Rural Development and DoE in Kayin State
Pacts Myanmar	1-Water Safety Plan 2-4-Cleans 3-QA 4- O&M 5-Environmental Sanitation (Vector control - drainage) 6-Fly Proof Latrine(sanitation)	Four townships in Loikaw and three townships in Kayin. In Kayin, Kyar Inn Seik Kyi, Hlaingbwe and Than Taun Kyi	Partnership with MOHS.
The Boarder Consortium	Rural WaSH	Cross boarder	
Other			
Monasteries	Drinking water supply	Everywhere where monk community, rural, urban,	Monks have a huge role in WaSH in the communities. They run a water piped system in Hpa An town and provide drinking water for in dry season, even in Yangon.

[1] Including KNU MoH, Karen Department of Health and Welfare (KDHW)

[2] Border Guard forces

[3] Department of Social Welfare

[4] Myanmar Red Cross Society

[5] Also implement Health Education Training and Mobile Clinic

[6] Ministry of Health and Sport

[7] Governmental Direction of Social Welfare

[8] Also do school construction, health and nutrition (Mother and Child) program in five townships (Belin, Hpapon, Hlaingbwe, Kyar Inn Seik Kyi and Kawkareik) in Kayin State.

[9] <https://www.aeon.info/en/>

[10] Ministry of Foreign Affairs of Japan

[11] Also do education, shelter, school construction and IDPs support.

[12] Myanmar Ministry of Immigration, Labour & Populations

[13] Department of Disaster Management

[14] Minutes from WaSH coordination meeting Aug-2th, 2019

Note: UNOPS funded WaSH services have been noticed in Health facilities in Kawkareik during the mission

	Name	Position	Location	Structure	Contact	Interviewed
UN Agencies						
1	Sunny Guidotti	Myanmar WASH Cluster Coordinator	Yangon	UNICEF	Tel: (+95) 1 2305960-69 (Ext. 1595) Mob: (+95) 977 500 3850 Fax: (+95) 1 2305956 E-mail: sguidotti@unicef.org Skype: sunny_mtu	in maternity leave
2	James Robertson	WASH Specialist UNICEF	Yangon	UNICEF	James Robertson <jrobertson@unicef.org>	✓
3	Ye Min Aung	WaSH officer	Hpa An	UNICEF	ymaung@unicef.org 09443173118	✓
4	Patrick	Chief of Office	Hpa An	UNICEF	+955822678 / +9594596707761 pshing@unicef@org	✓
5	Maureen F. McBrien	Chief of Office	Hpa An	UNHCR	mcbrienm@unhcr.org	✓
Government/ Non state actors						
6	Snoad, Christian	WASH advisor	Yangon	HARP	Christian.Snoad@harpfacility.org>	✓
7	Dr Sue	Assistant Program	Hpa An	KDHW		✓
8	January Htun	Finance Assistance director	Hpa An	KDHW		✓
9	Sir Henry	Logistics (ex PUI)	Hpa An	KDHW		✓
Red Cross Movement						
10	Benjamin Sanchez	Water & Habitat Coordinator	Yangon	ICRC	<bsanchez@icrc.org>	v
INGO						
11	Eric FORT	CD	Yangon	ACF	<cd@mm-actioncontrelafaim.org>	
12	Lawrence Mai	Field Co	Kayah	ACF	Lawrence Mai <fc-lkw@mm-actioncontrelafaim.org>	v
13	Nay Htoo	Area Manager	South East	NRC	Nay Htoo <nay.htoo@nrc.no>	v
14	Shada qahoush	Shelter lead	South East	NRC	Shada Qahoush <shada.qahoush@nrc.no>	v
15	Laura Marshall	CD	Yangon	NRC	Laura Marshall <laura.marshall@nrc.no>	
16	Thidar Aye	Mission Technical Referent (WatSan)	Yangon	Medecins Sans Frontieres (MSF) Holland	Tel: mobile: 09-798475967; office: 01 855 12 64 E-mail : myanmar-watsan@oca.msf.org Skype : thidaraye16 Address: 5/59, Ayevedanar Street, Thirigon Villa Waizayandar Road, Thingangyun Tsp, Yangon, Myanmar	✓
17	Thomas de Van	Operation director	Yangon	CSI	<thomas.devan@csi-global.org> 00 95 9 2505 86795 https://www.centerforsocialintegrity.org/ .	
18	Pier Francesco Donati	OXSI Sittwe WASH Consortium Manager	Yangon	Oxfam	<PDonati@oxfam.org.uk> +9509426143412 skype: donati55 https://myanmar.oxfam.org/	✓
19	Julie Thuriere	CD	Yangon	SI	ygn.hom@solidarites-myanmar.org	
20	Valentina BIDONE	WaSH Coordinator	Yangon	SI	ygn.wash.coordo@solidarites-myanmar.org>	✓
21	Shihab Uddin Ahamad	CD	Yangon	WaterAid	<ShihabAhamad@wateraid.org>	✓
22	Kaspar Roelle	Humanitarian Programme Advisor	Yangon	Oxfam	<KRoelle@oxfam.org.uk> , Oxfam in Myanmar Mobile +95 9799258447 Skype: kaspar.roelle	✓
23	Fukio Tsuji	Program Director	Hpa An	Peace Winds Japan	fukio_tsuji@peace-winds.org	✓
24	Saw Sun Nay	Project Manager	Hpa An	Peace Winds Japan	sunny.hg.pwj.myanmar@gmail.com	✓
25	U Kyan Shuh	Hydrogeologist, Water engineer	Hpa An	Peace Winds Japan		✓
Private sector						
26	Adrien Baudron	Commercial	Yangon	Suez Myanmar		✓

Main secondary sources figure below but are not limited. Further reference are available in the core document:

PUI AFD/ Suez Proposal

WaSH cluster website : <http://www.themimu.info/emergencies/wash-cluster>

WaSH sector website : <http://www.themimu.info/sector/wash/>

Myanmar Census 2014 : <http://www.dopredatam.gov.mm>

National_Strategy_for_Rural_Water_Supply_Sanitation_Hygiene_WASH_2016-2030_ENG

National_Investment_Plan_for_Rural_Water_Supply_Sanitation_Hygiene_WASH_2016-2030_ENG

Myanmar Living Conditions Survey 2017/ 03-Poverty report. June 2019, World Bank.
<http://documents.worldbank.org/curated/en/921021561058201854/pdf/Myanmar-Living-Condition-Survey-2017-Report-3-Poverty-Report.pdf>

Context

Pha Gyi Village, Kawkareik Township.

Baseline

- Drinking and domestic water come from open wells (measured water table 0 to 8m under the ground level). Water quality is not stable between dry and wet seasons with a major risk of diseases.
- Wells are empty several months in the years. The villagers fetch drinking water from River during the dry season.
- 2 existing toilets in medium level

Population

- Village: 480 inhabitants estimated, scattered (low density of population)
- School: 120 students (from neighboring villages), 5 teachers

Water analysis of current water source (open well):

	Result	Target
pH	6,2	6-8
Conductivity (µS)	117µS	
TH (°f)	3,6	20
TA (°f)	0	
TAC (°f)	4	
Iron(mg/l)	0,34	0,5
DCO (mg/l)	5,1	
Turbidity(NTU)	1,2	5
Flore bacterium (UFC/ml)	10000	

The mineral quality is quite good. The water is little bit acid with a very low level of minerals. The level of bacteriology is slightly high but the Carbone pollution is law. This water mix with rainwater.

Risks: During the dry season, the mineral and pollution are concentrated, which lead to an important risk of disease for the population.

Proposed solution

Drill a borehole will have the advantage to have a good and stable water quality across the years. The borehole will be equipped with a submersible pump and water will be stored in a tank and supplied through a standpipe.

This water will be for domestic and drinking purposes.

Sizing

- 400 inhabitants
- 120 students

Standards: Myanmar National WaSH Strategy

The table below shows the results of the water needs calculation that will be taken into account in the design study:

	Number	Water consumption (L/day)	Daily volume	Number of taps to be provided
Inhabitants	373	45	16,8	10
Students	120	3	0,4	3
patients	0	25	0	0
TOTAL			17,1	



Initial targeted school, Pha Gyi Village.



Existing well and water analysis, Pha Gyi Village



Existing toilets



Water sample, analyzed in a laboratory, France, Sept 2019.

⇒ The total gross water needs considered is 17,1 m3/d

The different parameters taken into account in the study to obtain the net water needs are presented below:

Safety margin	Network efficiency
20%	75%

The results of the calculation of net water needs and average flows over 24 hours and 6 hours are presented below:

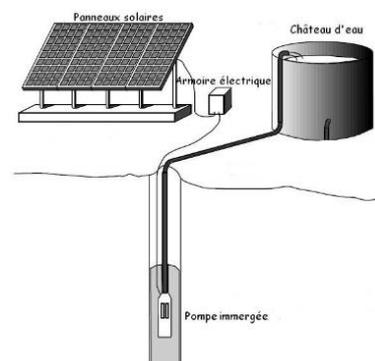
Beneficiaries considered	Total volume consumed (m3/d)	Average flow rate over 24 hours (m3/h)	Average flow rate over 6 hours (m3/h)
Inhabitants	28,6	1,2	4,8
School	0,6	0	0,1

⇒ The total net water needs considered is 29 m3/d.

⇒ The drilling pump must be able to pump a flow rate of about 5 m3/h for 6 hours to ensure the supply of water needs.

⇒ A tank with a usable volume of 30 m3 is recommended

Pumping system



Solar pumping operating as the sun shines is recommended. This type of configuration requires less equipment and therefore reduces the risk of failures. The drawing besides shows a system of pumping through the sun.

Pump characteristics:

- Discharge flow rate : 5 m3/h for 6 hours minimum
- Total Dynamic Head (TDH) : Will have to be calculated after performing the pumping tests

Solar energy production system characteristics:

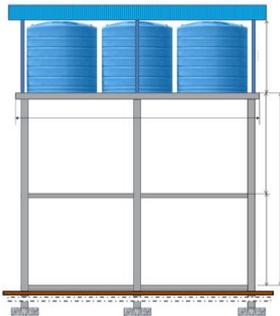
- Operation as the sun shines (without batteries)
- Must be sized to be able to supply the pump at a flow rate of 5 m3/h for at least 6 consecutive hours 365 days a year (sizing taking into account the worst sunlight conditions)

Drinking water tank :

The water tower will consist of a reinforced concrete structure topped by a platform on which 3 tanks with a unit capacity of 10,000 L will be placed. The supply with a float valve will be made on one of the tanks that will be connected to the other two, which will fill naturally.

The tanks will be protected from the elements by a metal or wooden frame, with a cover made of pre-painted galvanized sheet metal. At the base of a tank, two connections with isolation valve will allow the connection of the hydrants to the two distribution networks.

The drawing below shows the type of tank recommended:

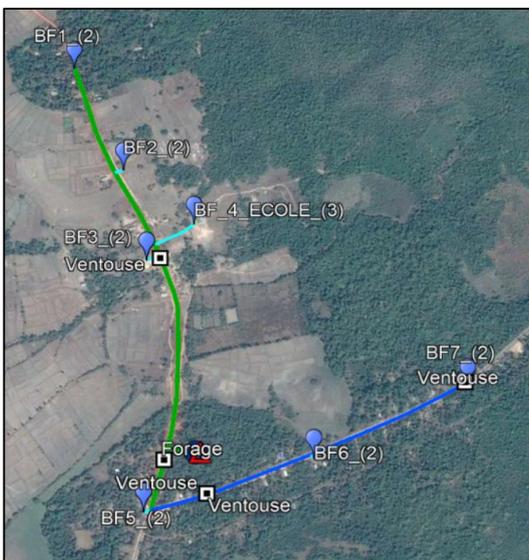


Tank characteristics:

Height of the tank bottom : + 10m from the ground level
 Available volume : 30 m3 (3 x 10 m3)

Drinking water network:

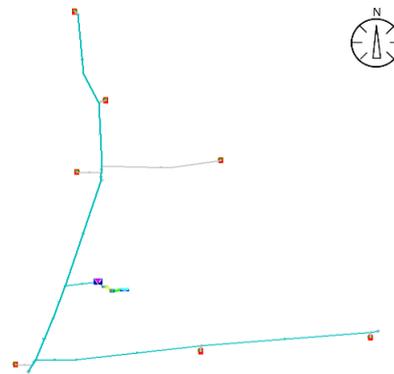
The network plan below shows the location of the structures to be built to supply the community with water.



The table below shows the peak flows used to calculate the size of the distribution system :

	Number of water taps	Peak flow rate (m3/h)
BF1	2	1,5
BF2	2	1,5
BF3	2	1,5
BF4 School	5	3,75
BF5	2	1,5
BF6	2	1,5
BF7	2	1,5

A hydraulic model of the drinking water network was carried out using PICCOLO® software. The hydraulic model carried out made it possible to study different network configurations and define the solution to be adopted. The screenshot below shows the hydraulic model made :



⇒ The model allows for optimized network sizing

School sanitation

Standard : Myanmar National WaSH Strategy

With 120 students and 4 teachers, the school need 3 news Latrines if we consider 2 latrines for the boy and 2 latrines for the girl (1 for the teachers)