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Štěpánka PECHÁČKOVÁ

Arsenic Mitigation in Bangladesh from the Recipients' Perspective: Evaluation of a local non-governmental initiative

Master Thesis

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I declare in lieu of oath that I wrote this thesis myself. All information derived from the work of others has been acknowledged in the text and a list of references is given.

Olomouc, 2014 .....

Signature

Acknowledgments

I would like express my gratitude to my supervisor Mgr. Jiří Pánek who motived and supported me through the whole stormy and changing cruise of writing this thesis. I cannot tell how much I am grateful to my friends and classmates Iva Musilová and Markéta Nešporová and to Dr. Maria Rato Barrio who pointed the way when I was lost on the sea. Further thanks go to my foster mother and sister Hana and Anna Šteyerová who as always checked my English steering. Thank you, my friends and family who were on the boat with me when I needed it. Last but not least, huge thanks go to all the staff of Thanapara Swallows who enabled me a life-changing experience of sailing in the extraordinary waters of Bangladesh.

Content

Introduction

Arsenic contamination of groundwater in Bangladesh is one of the largest poisoning in the world. It affects millions of people because groundwater is the main source of water for drinking, cooking, and bathing in the country. Exposition to arsenic causes serious health conditions which in turn have socioeconomic consequences for the individuals as well as the whole society. Arsenic contamination is interlinked with poverty and its deprivation trap.

There have been many efforts to mitigate arsenic contamination of groundwater in Bangladesh. However, most of them approached the issue as technical exercise, with only limited focus on other aspects such as social development. Few of the arsenic mitigation initiatives were actually implemented in terms of community development even though they claimed to be.

Community development is, however, a basic tool for achieving social development (Stoesz, Guzzetta, & Lusk, 1999, chap. 7). It is a key strategy in poverty alleviation and other fields. There is hardly an aspect of international social work in which community development does not potentially play a vital role (Cox & Pawar, 2006, p. 98).

This thesis qualitatively evaluates a local arsenic mitigation initiative in Bangladesh from the perspective of recipients. It analyses the perspective of the recipients and translates the findings into recommendations in terms of community development. The objective is to influence decision-making of the aid-providers through the provision of empirically-driven feedback on their arsenic mitigation work.

First, the thesis sets the country context and introduces the issues. Then, it describes the response to arsenic contamination that has taken place in Bangladesh. Next, it defines the concepts of Sustainable Livelihoods Framework and community development that framed data collection and analysis and formulation of the recommendations, respectively. Finally, it presents the empirical part of the study, its methodology, findings, recommendations, and discussion. Most of the references used for the study are foreign resources, particularly publications, reports, and articles available in the online databases. The thesis follows the citation style of American Psychological Association.

The evaluation study results from my internship in Bangladesh. I chose the topic because I specialize in water and sanitation sector and the issue of arsenic contamination has not yet been much related to community development. Also, no such evaluation had been done before regarding my hosting organization.

1. Country profile: Bangladesh

Bangladesh has around 156 million people (Bangladesh Bureau of Statistics [BBS], 2014), and 147,570km² area (Government of Bangladesh [GoB], 2011). Locked between India and Myanmar, it accesses Bay of Bengal in the south. It is mainly lowland country on the Ganges (Padma), Brahmaputra (Jamuna), and Meghna river system. About 80% of the country consists of floodplains and wetlands with over 300 rivers in the riverine network (Ministry of Environment and Forests [MoEF], 2012, p. 12). Most of the country thus lies within 9m above the sea level (Encyclopædia Britannica, 2014, Land section, para. 2). The only significant hill system, Chittagong Hills, is to be found in the southeast, with average height of about 600m (Roy, 2000, p. 19). Due to its location and geographical characteristics, Bangladesh is very prone to environmental disasters, particularly floods and typhoons. Bangladeshi population comprises of 90% Muslims and 10% Hindus, Christians, Buddhists, and others (Central Intelligence Agency, 2014).

Bangladesh's history is inseparably linked with the greater area known as Bengal. Bangladesh belonged there alongside with the eastern part of today's India. Now West Bengal of India and Bangladesh share the same language, Bengali or Bangla. Bengal remembers the great ancient Buddhist kingdoms; alternating rules of first Hindus, than Muslims and eventually, of the British Empire. At the end of their dominance, the British parted the colonized areas on the basis of a religion, leaving what is now Pakistan and Bangladesh in one country. Then West (Pakistan) and East Pakistan (Bangladesh) were set apart by India and shared neither same language, nor same culture. The supremacy of Pakistan led to Bangladeshi revolts and to the 1971 Civil War. With help of India, Bangladesh won and the People's Republic of Bangladesh was established in 1973.

Since then Bangladesh followed a path of political turmoil, reinforced by famine that struck after the independence. In the second half of 1970s General Ziaur Rahman took over as a martial-law administrator and became a president. His Bangladesh National Party (BNP) won elections and martial law was lifted. During the 1980s, the country progressed economically but in the early 1990 the economy worsened. Massive rallies and strikes, so called *hartals*, were held. General's wife, Begum Khaleda Zia, as a head of BNP won the ensuing election over the opposing Awami League (AL) and became a prime minister.

The AL never fully accepted the election results. In 1996, the BNP-led government was brought down, following the long and economically ruinous period of hartals. The fights and boycotts between the two parties via hartals, rallies and even violent actions, affecting largely the socioeconomic life of the ordinary people, illustrate the political situation in Bangladesh up to date. The time preceding the last election held in January 2014 was marked with

politically motivated murders, bomb explosions, endless hartals, and demonstrations. The ruling AL won and Sheikh Hasina has remained a prime minister.

Bangladesh has always attracted the attention of international donor community since its independence. Every few years affected by floods and/or a typhoon, alongside with 31% poverty line (The World Bank [WB], 2014a), contributed to that. The country has been perceived to be an "international basket case", a nickname invented by a former US-Secretary Henry Kissinger (Ahmed, 1988; Krishnan, 2011; Nasir, 2010). Now there are tens of thousands both international and local non-governmental organizations and other stakeholders of foreign aid. Their influence on and within the country is hard to determine exactly but is sure to be vast.

Table 1. Improvements in some human development indicators since 1990, Bangladesh and South Asia (Mahmud, 2008, p. 81).

Indicator		1990	2002-2004
Gross primary enrolment (%)	Bangladesh	80	109
	South Asia	*95*	*103*
Ratio of girls to boys in primary and secondary education (%)	Bangladesh	77	107
	South Asia	*71*	*89*
Under-5 mortality rate (per 1,000 live births)	Bangladesh	144	69
	South Asia	*130*	*86*
Population with access to improved sanitation (%)	Bangladesh	23	48
	South Asia	*20*	*37*

Estimates of access to sanitation are from UNDP's Human Development Report 2005. All other estimates are compiled from the WB's World Development Indicators.

Despite dropping in the WB's Least Developed Countries category and being seen as almost hopeless, Bangladesh has made some remarkable progress. Since 1975 to 2008, the annual rate of population growth was halved to 1.5%, life expectancy has risen from 50 to 63 years, child mortality rates have been cut by 70%, and literacy has more than doubled (Mahmud, 2008, p. 79). In the 1990s, Bangladesh ranked among the top performing countries in the extent of improvement in the United Nations Development Program's (UNDP) Human Development Index. It is among the few developing countries that are on target for achieving the Millennium Development Goals (MDGs) (WB, 2005; GoB, 2007). Last but not least, since 2008 Bangladesh maintained its economic growth at an average of 6% per year (MoEF, 2012, p. 4).

Yet still there are challenges for the country to tackle. Most of the people work in the informal sector without any job security or retirement benefits. Majority works in or is related to agriculture where landlessness is becoming the pressing issue. Income inequality has

increased. Urban poverty is also growing due to rapid unplanned urbanization (MoEF, 2012). More than a half of the population will likely live in the cities by 2050 (MoEF, 2012, p. 72).

Bangladesh remains a highly patriarchal society where women have only low status. Female participation in the labour market is 57.3% compared to 84.1% for men (United Nations Development Program [UNDP], 2014). Only 28% of women are literate (MoEF, 2012, p. 30). There are archaic, colonial- and religion-based laws that are often discriminatory towards women, especially in the field of divorce or marital property (Human Rights Watch, 2012). Bangladeshi women suffer from widespread sex and gender-based violence––the 2011 survey by United Nations Population Fund and Bangladesh Bureau of Statistic found that 87% of Bangladeshi women and girls experience such violence at least once in their life time (Ministry of Planning & United Nations Population Fund, 2011, p. xvi). Socioeconomic status of a woman in Bangladesh is almost solely derived from a man, be it a father, a brother or a husband.

Since 1990s the primary and secondary school enrolment increased considerably and gender parity was achieved (MoEF, 2012, p. 30). However, there have been problems of teacher quality, absenteeism, and poor school infrastructure which caused shifting from public to private schools and other non-state providers (Mahmud, 2008, p. 86). Though generally illiteracy was reduced, it still rests very high (MoEF, 2012, p. 30).

Although since the 1990s the infant mortality rate declined by 34% in 2009 and the under-5 child mortality rate dropped by 73% (MoEF, 2012, p. 29)[1], there is still improvement needed. Marital mortality remains high with 240 per 100,000 live births (UNDP, 2014). Only 15% of births took place in a health facility and 18% were delivered by a trained person in 2007 (National Institute of Population Research and Training [NIPORT], 2009, p. 117–118). However, there has been an advance in the contraception use rates (Mahmud, 2008, p. 80; Mahbub ul Haque Human Development Centre, 2007, p. 203). Regarding the diseases, occurrence of diarrhoea and other water-borne diseases decreased, polio is virtually eliminated and the incidence of HIV/AIDS is less than 0.1% (MoEF, 2012, p. 290).

Even though Bangladesh has problems of poor service delivery in social sectors, the country's experience has shown that: (1) it is possible to achieve rapid progress in many social development indicators amid widespread poverty; (2) social attitudes and behavioural norms can change over a much shorter period than is usually assumed, and (3) it is possible to achieve near-universalization of some aspects of social protection simply by creating awareness and using low-cost affordable solutions. Strong presence of development NGOs,

[1] The infant mortality rate was 87 per 1,000 live births in 1994 and 39 in 2009. The under-5 child mortality rate was 50 per 1,000 live births in 2009 as opposed to 146 in 1991 (MoEF, 2012, p. 29).

the density of settlements, and lack of remoteness of the settlements helped in achieving such progress (Mahmud, 2008, p. 89).

Bangladesh is a parliamentary democracy, with a unicameral parliament called Jatiya Sangsad. The president is the head of state and is elected indirectly by the parliament. Of 345 parliament seats there are 45 places are reserved for women. All are elected directly. The president appoints a leader of a majority party as prime minister and head of the government. The cabinet is appointed by the president as well and has 45 members (Commonwealth Local Government Forum [CLGF], 2011, p. 25).

Bangladesh is territorially divided into seven divisions: Dhaka, Chittagong, Rajshahi, Khulna, Barisal, Sylhet, and Rangpur (GoB, 2014). Rural local government has three tiers: 64 zila (districts) parishads, upazila (sub-district) parishads, and union parishads (WB, 2011, p. 1; CLGF, 2011, p. 25; GoB, 2014). There are also three hills district parishads (CLGF, 2011, p. 25). The sources differ on exact numbers of upazilas and unions, which can be seen in Table 2.

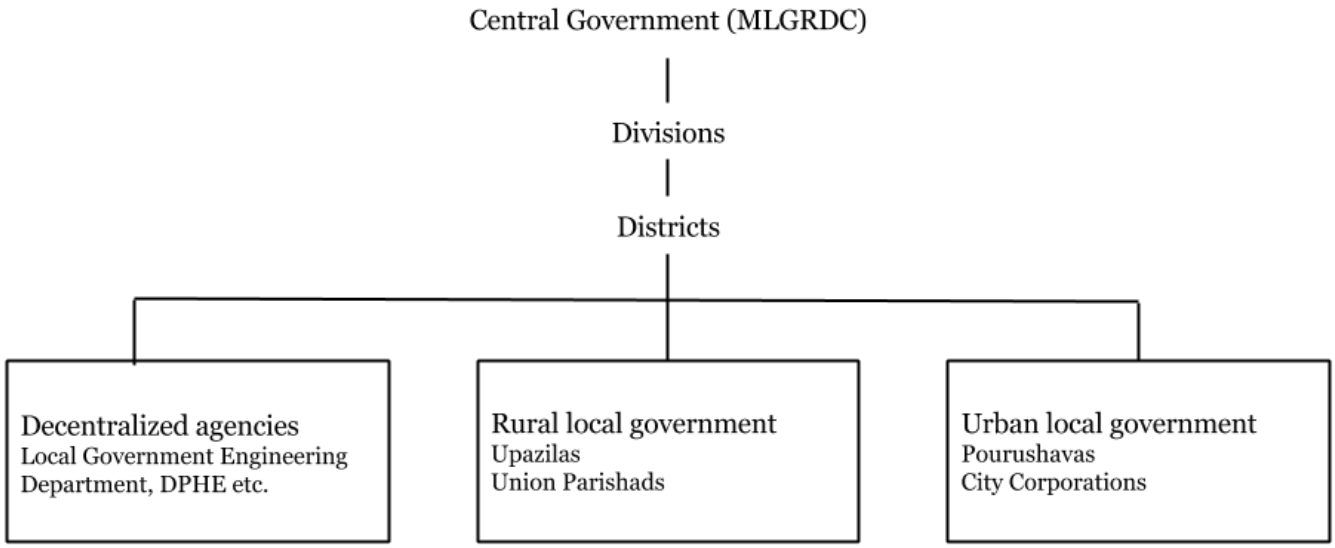
Table 2. Number of the administrative units in Bangladesh by source

	The World Bank (WB) (2011)	Commonwealth Local Government Forum (CLGF) (2011)	GoB (2014)
No of upazilas	508	469	488
No of unions	4,498	4,484	4,550

Urban areas have two alternative structures: city corporations in the six largest cities and pourashavas (municipalities) in the rest of the country that are further sub-divided into wards. The union parishad chairpersons, pourashava and city corporation mayors are directly elected by popular vote of the entire constituency while the ward members/commissioners are elected by their respective constituencies (WB, 2011, p. 2).

Governance in Bangladesh is characterized by the high level of bureaucracy and centralization. The governance system in Bangladesh is one of the most fiscally centralized in the world (WB, 2011, p. 1). The priority in the present government development strategy is the elimination of poverty and inequity. The aim is to bring down the poverty line to 15% by 2021 (GoB, 2012, p. 24), from 31% in 2014. Bangladesh is striving for becoming a middle income country by 2021 (MoEF, 2012, p. 6), with all it implies for the society and economy. The country has definitely made remarkable progress in a number of indicators but there are still challenges to overcome. Commitment formulated theoretically is not enough. It needs to be put into practice, both in the general terms and in arsenic mitigation.

Figure 1. Sub-national Government Structure (based on WB, 2011, p. 2).



2. Arsenic contamination of groundwater in Bangladesh

2.1 Background

Arsenic contamination of ground, potable water is a global concern all over the world, not only in Bangladesh. Yet Bangladesh is said to be the most affected (Jiang, Ashekuzzaman, Jiang, Sharifuzzaman, & Chowdhury, 2013, p. 1) or is even to experience 'the largest water pollution event in the world' (Ahmed, 2005, p. 283). As many as 97% of the Bangladeshi population use groundwater sources as their water supply, not only for drinking and cooking purposes (Dhaka Community Hospital, 1998 as cited in Hossain, Islam, Gani, & Karim, 2005, p. 164) but also for irrigation (Ahmed, 2005, p. 283).

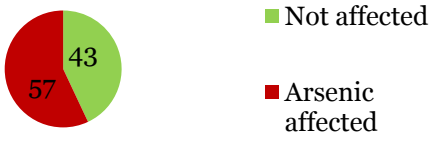
Such widespread access to water supply—one of the big development successes in Bangladesh—has been achieved due to mainly Western donors driven activities since 1970s. New, then allegedly safe groundwater resources were built to use instead of surface water, a source of bacteriological infections and other water-borne diseases. However, the sources were not tested for arsenic presence. The element was first found in groundwater resources of Bangladesh in 1993 (United Nations International Children's Fund [UNICEF], 2008, p. 1; Ahmed, 2005, p. 283).

2.2 Extent of arsenic pollution

The estimated numbers of Bangladeshi exposed to arsenic varies from 20 to 77 million people (Ahmed, 2005, p. 283; Hossain et al., 2005, p. 163; Jiang et al., 2013, p. 20) of total population about 150mil in Bangladesh (GoB, 2011). The extent of the pollution among people is altered too if different guideline values for arsenic in drinking water are used. The World Health Organization (WHO) recommended limit is 10µg/litre while Bangladesh has 50µg/litre (Department of Public Health Engineering [DPHE], n.d., Health effect section, para. 2) as well as most of the developing countries do (Moinuddin, 2004, p. 8). A study conducted by the British Geological Survey (BGS) and the Department of Public Health Engineering (DPHE) of Bangladesh in 1999 estimated that out of then Bangladeshi population of 125.5 million, up to 57 million were drinking arsenic contaminated water above the WHO guideline level (p. 231). Up to 35 million people (BGS & DPHE, 2001, p. 231) were using potable water with concentrations of arsenic excessing the Bangladeshi Drinking Water Standard (BDSW) (Ahmed, 2005, p. 283).

Figure 2. Arsenic affected people in % when the BDWS is used

Figure 3. Arsenic affected people in % when the WHO guideline value is used



It has been found that groundwater resources in the north of the country contain less concentrations of arsenic than in the south (Ahmed, 2005, p. 285). Islam and Uddin (2002) claim the distribution of arsenic in groundwater relates to the geological structure of the country. Consequently, the authors divided Bangladeshi aquifer systems from the geological point of view, concluding that most of the arsenic-contaminated tube wells are drawing water from the Middle and Upper Holocene (p. 16). Conversely, arsenic-free tube well water mostly comes from the Shallow Holocene fan deposits and Deep Plio-Pleistocene aquifer (Ahmed, 2005, p. 288).

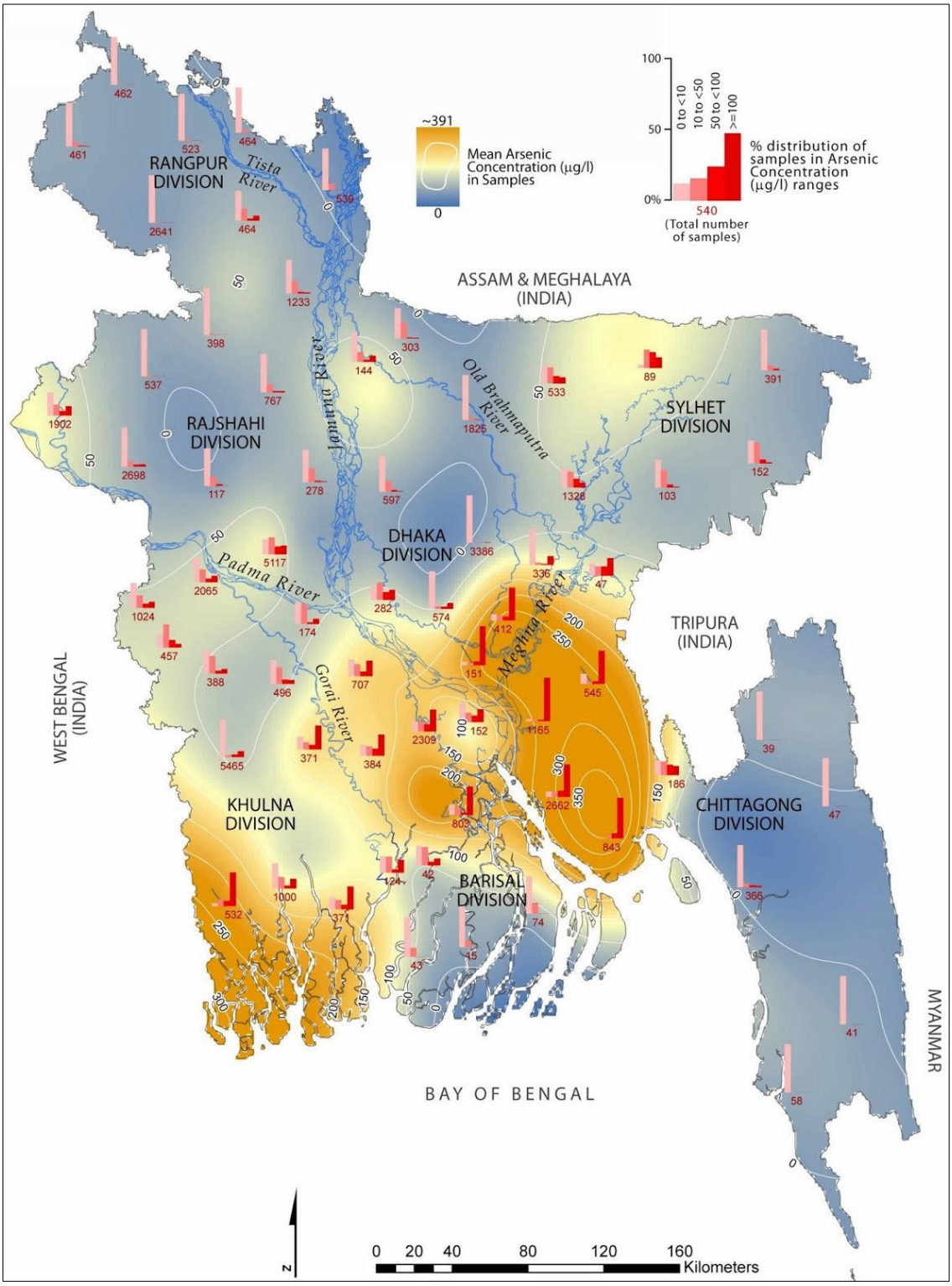
The number of districts where arsenic was detected differs. Some authors state 61 out of 64 districts in Bangladesh have arsenic in groundwater (Moinuddin, 2004, p. 8), some say 60 (Jiang et al., 2013, p. 22), some put forward 59 (Hossain et al., 2005, p. 164). There are also extreme variations in the extent of arsenic occurrence from the district to the village level. Some sub-districts or upazilas had almost all tested wells exceeding the BDWS, some did not. In the villages unsafe and safe wells are often located next to each other (Ahmed, 2005, p. 284–287). Interestingly, arsenic pollution is mainly the problem of rural areas. The capital city of Dhaka, even though almost entirely depending on groundwater (Ahmed, 2005, p. 286), has more or less arsenic-free water supply (Moinuddin, 2004, p. 8).

There are also differences among the levels of depth where arsenic occurs, i.e. there is no specific depth for arsenic-safe water (Ahmed, 2003a in Ahmed, 2005, p. 286). Peak concentrations of arsenic were found 20-40m deep. Concentrations in aquifers above and below were lower (Ahmed, 2006, p. 285). Authors mostly agree that arsenic-free water generally comes in the depths from 150m and more (BGS & DPHE, 2001, p. 231; Ahmed, 2005, p. 285).

2.2.1 Arsenic in food chain

Drinking water is not the only way how arsenic gets to a human body. Recent data acknowledged the presence of arsenic in the food chain (Food Agriculture Organization [FAO], UNICEF, World Health Organization [WHO], & Water Sanitation Program [WSP], 2010, pp. 10–11; Huq & Naidu, 2005, pp. 95–96). Between 30 to 40% of net cultivable land in Bangladesh is irrigated. Around 60% of the total amount of irrigation water comes from groundwater (Huq & Naidu, 2005, p. 96).

Figure 4. Arsenic concentrations in groundwater of Bangladesh (Jiang et al., 2013, p. 23).



The map shows all 64 districts under seven administrative divisions of Bangladesh. Jiang et al. based the map on 14-year-long study of Chakraborti et al. (2010).The study represents probably the latest data on arsenic distribution in Bangladesh available.

Arsenic gets to the food chain either from crops and plants or animals and their products. The studies in some districts of Bangladesh showed that “rice can contribute significantly to the daily intake of arsenic” (FAO et al., 2010, p. 10). Hug and Naidu (2005) found that “many crops receiving As contaminated water as irrigation…accumulate As at levels that exceed the maximum allowable daily limit (MADL) of 0.2mg per kg dry weight ” (p. 95). The authors summarize that crops irrigated with arsenic contaminated water take up the element and amass it in various degrees, depending on the crops’ species or the type of soil they grow in.

Additionally to the edible crops, arsenic can enter the food chain via fodder crops. Cattle mainly consume rice straw in Bangladesh, so arsenic contaminated straw feed can negatively influence both health of an animal and quality of its products. Cattle manure can contain arsenic. Manure being used as main fuel in Bangladesh represents another way of human exposure to arsenic (FAO et al., 2010, p. 10). Though exact impact of arsenic in the food chain has on humans is yet to be set.

2.3 Causes

Arsenic is to be found throughout the environment due to both natural and man-mad processes (Gilbert, 2012, p. 128–129; BGS & DPHE, 2001, p. 4). Most of arsenic environmental problems have natural causes. But humans have considerably influenced occurrence of arsenic in the environment through activities such as burning of fossil fuels, using arsenical pesticides and herbicides (BGS & DPHE, 2001, p. 2) or smelting for copper, lead, and zinc (Gilbert, 2012, p. 128).

Arsenic contamination of groundwater does not occur randomly. It is rather controlled by hydro-geological processes (Ahmed, 2005, p. 283) and it originates from hydro-geological conditions of the country. Hossain et al. (2005, p. 170) attribute the cause of arsenic contamination of groundwater in Bangladesh to the withdrawal of water from rivers in India, deforestation and exuberant use of groundwater.

2.4 Effects

2.4.1 Health effects

Arsenic occurs in nature in the organic and inorganic forms. Groundwater contains the inorganic form. This form is much more harmful to human health than the organic form, presented in seafood (WHO, 2012, Health effects section, para. 1; Gilbert, 2012, p. 134).

Health effects of chronic exposure to inorganic arsenic are called arsenicosis (UNICEF, 2008; FAO, et al., 2010, p. 8; Moinuddin, 2004, p. 7). They manifest slowly (Smith, Lingas, & Rahman, 2000, p. 1095; UNICEF, 2008, p. 2). Early symptoms are garlic odour on the breath, excessive perspiration, muscle tenderness and weakness, and changes in skin

pigmentation. The most prominent long-term effects are skin lesions and hyperkeratosis[2] (WHO, 2012, Health effects section, para. 1; FAO et al., 2010, p. 8). Other long term effects of arsenic exposure include cancer (of skin, bladder, kidney, and lungs), hypertension and cardiovascular diseases, anaemia, neurological effects, pulmonary disease, peripheral vascular disease, and diabetes mellitus (Smith et al., 2000, p. 1096; WHO, 2012, Health effects section, para. 2–3; Gilbert, 2012, p. 132; UNICEF, 2008, p. 2).

The children are especially prone to the health effects of arsenic exposure. An increasing body of evidence shows that prenatal arsenic exposure is associated with significant morbidity and mortality later in life (FAO et al., 2010, p. 8). Arsenic poisoning is also worsened by malnutrition. Malnourished people are twice more likely to develop arsenicosis than the well-nourished ones (UNICEF, 2008, p. 2).

A lot of the symptoms are dose and time dependent. The period of time in which for instance the manifestations on skin will occur is not firmly established—it differs from five years (WHO, 2012, Health effects section, para. 3) to 10 and more (Smith et al., 2000, p. 1095). Moinuddin (2004, p. 11) states the latency for arsenic-caused effects on health may take from two to twenty years. The period depends on the amount of arsenic ingested, nutritional status of the person, immunity level of the individual, and the total time period of arsenic ingestion.

Variety in the symptoms and their occurrence between individuals, population groups, and even geographical places make it harder for the problem identification and diagnosis. For instance, we cannot determine exactly the effect of arsenic has on cancers. There is no way how to find out reliably the magnitude of the issue worldwide (WHO, 2012, Magnitude of the problem section, para. 4).

2.4.2 Socioeconomic effects

Besides serious impact on human health, arsenic poisoning and its symptoms have as serious social effects. Arsenicosis can mean “enormous social stigma” (UNICEF, 2008, p. 2). People suffering from this condition meet with prejudices and ignorance, leading to isolation from society and problematic social status.

Hassan, Atkins, and Dunn (2005) in their research in southwest Bangladesh found that the arsenic-affected can deal with a number of issues. They face ostracism, being avoided by the other members of the community and even by their friends and family who believe arsenicosis is contagious. At the community level, they might be denied access to the shared drinking water resources, avoided in public places such as shops or tea stalls[3], or discriminated by their employers and community leaders. Within family and friends ties,

[2] Hard patches on the palms and soles of the feet (WHO, 2012, Health effects section, para. 3).
[3] Tea stalls and other hospitality facilities are one of the main places where public life happens in Bangladesh.

they can experience indirect neglect and isolation. “Parents feel hesitant about being close to their children, and husbands keep a safe distance from their wives” (p. 2207).

The most socially vulnerable groups are children, women, and the poor. An arsenic affected child can be denied access to school. If they are allowed, they cope with segregation. Other children do not want to sit or play with them. Moreover, the parents of unaffected children might not allow them to play with the affected ones.

Women suffering from skin lesions, hyperkeratosis or other arsenic manifestations on the skin have even worse social status than women already bear in traditionally patriarchal Bangladesh. Husbands neglect their wives, even divorce them or send them to their parental homes with children (Milton et al., 1998, para. 14). Single women face problems with finding a husband, often being demanded higher dowry than usual, or are unable get married at all (Hassan et al., 2005, p. 2207; Arsenic Policy Support Unit [APSU], 2006, p. 11–12; Zaman, 2001, para. 6, 16). In Bangladesh, women are socially and economically dependent on men. Besides having arsenicosis, being left by a husband or not being able to get married represent serious social hazards for them.

Arsenic poising is interlinked with poverty. It is believed that the severity of arsenicosis is related to a nutritional deficit (Moinuddin, 2004, p. 12; UNICEF, 2008, p. 2). The poor are financially limited in safe water options and treatment (Moinuddin, 2004, p. 12; Rammelt & Boes, 2005, p. 313). Arsenicosis brings about severe health constraints, thus diminishing the affected people’s ability to work (Nasreen, 2002 in Moinuddin, 2004, p. 12). The limited ability to work can have undesirable economic consequences in terms of the income stability as some of the arsenic affected people are the only earning members of their families (Hassan et al., 2005, p. 2206).

Estimates of the economic impact of arsenic poisoning suggest that the cost of inaction is extremely high. FAO et al. (2010, p. 8) states the Gross Domestic Product (GDP) output lost due to illness and people’s inability to work is USD23 billion. While the cost of treating arsenic related diseases is expected to be much lower at USD0.6 billion for a constant discount rate of 10% over a 50-year period.

Flanagan and Zheng (2011, p. 3) quantified that the population fraction estimates of district-level mortality attributable to arsenic range between less than 1% to as high as 17.5%. Based on the 2001 census population data, these fractions can be translated into almost 68,000 arsenic attributable deaths per year across the country. Moreover, the number is likely to be higher. The authors also calculated that the portion of GDP to be lost from arsenic-attributable mortality over the next 20 years is between USD6.1-20.1 billion depending on

discount rate selected. The estimated amounts of GDP lost due to the effects of arsenic poisoning are not negligible concerning the fact that Bangladesh GDP in 2012 was USD116.4 billion (WB, 2014a) while the GDP annual growth moves around 6% (WB, 2014b).

2.5. Mitigation

The primary treatment of arsenic poisoning is minimizing the exposure as soon as possible. Cutting of the intake of arsenic is complicated by the fact that arsenic occurs through different routes (FAO et al., 2010, p. 9). The main source of arsenic contamination in Bangladesh is drinking water though. Water management is the core of arsenic mitigation, with treatment of those affected by arsenic and raising awareness on arsenic issue.

2.5.1 Treatment of patients

There is no cure for chronic arsenic exposure. The symptoms can be only alleviated. Skin lesions and other skin manifestations can be treated with urea and salicylic acid lotions which ease the pain. The symptoms can be also improved with a good diet: using multi-vitamins supplements such as selenium and vitamin A, and getting nutritious food.

2.5.2 Awareness

Raising awareness of arsenic is crucial as well as challenging for three reasons. The first reason is the element itself. Arsenic is odourless, colourless, and tasteless (Moinuddin, 2004, p. 19; UNICEF, 2008, p. 3), so it can be spotted in water only using testing methods. Local people may find it hard to believe that a resource they used for such a long time is "suddenly" dangerous. Arsenic enters a human body in multiple ways, not only through water which may be easily forgotten or not known.

The second reason is the social effects of arsenicosis. Patients suffering from arsenicosis are at risk of social stigmatization and exclusion due to myths and prejudices related to the disease. Exclusion of those affected is costly both socially and economically.

Third, it is the groups most vulnerable to arsenic contamination––women and the poor. The traditional, patriarchal and religious culture of Bangladesh does not provide women with the standards and rights typical for global North. Some women due to the religious practice of purdah, seclusion of female, may not be reached by the awareness-raising activities (Moinuddin, 2004, p. 13). However, the women are primarily responsible for managing water supply in Bangladeshi households. They play a pivotal role in providing their families with arsenic-safe water supply (Motaleb, 2010, p. 46). Another group of people that can be neglected in the awareness campaigns on arsenic is the rural poor. They often live in the remote areas without sufficient access to media and information (Moinuddin, 2004, p.19).

2.5.3 Technical options

The only treatment of arsenic pollution is to minimize exposure to arsenic-contaminated water. There are a few different options, involving surface water and groundwater as well as rainwater. The options either use existing water resources or require building of a new alternative resource.

Well-switching

One of the most readily available arsenic mitigation options is switching arsenic contaminated well for a nearby safe well (Ahmed, 2005, p. 287; Moinuddin, 2004, p. 21). It is an immediate, low-cost, and easy option. However, it is not the long term solution. It often requires sharing one water resource among different families which might be psychologically demanding, threating the community ties and relationships. It also overloads the resource's capacity (Ahmed, 2005, p. 290). Besides, managing water in a household is the women's role. Carrying water from a resource further away than the former one was makes their position more difficult than it is already (Moinuddin, 2004, p. 13). Another thing is that in the severely contaminated areas other wells with the tolerable arsenic levels do not have to be available. Or the wells that were apparently safe at the beginning may turn contaminated in the course of time (Moinuddin, 2004, p. 21).

Treatment of arsenic contaminated water

Most of the tube wells, the main source of drinking water in Bangladesh, are privately owned (UNICEF, 1999 as cited in Smith et al., 2000, p. 1094). This might make treatment of high-arsenic tube well water with chemical packets a favourable mitigation option. Even though these methods are in fact for use in the large conventional treatment plants, some of them can be reduced in scale and be applied at the household level. This has been done in other arsenic mitigation research programs in Bangladesh and India (Moinuddin, 2004, p. 22).

Such treatment of arsenic contaminated water is inexpensive in terms of materials but expensive in terms of training, monitoring, and evaluation (Smith et al., 2000, p. 1097). The household level viability of using this kind of mitigation option is questionable. The problem of sludge disposal does not help either (Moinuddin, 2004, p. 22; Smith et al., 2000, p. 1097). The more centralized option of the large-scale arsenic removal plants is constrained financially (Moinuddin, 2004, p. 22). Also, chemical treatment of arsenic polluted water "does little to alter the cumulative dose on which arsenic disease risks are based, and it may delay the planning for an arsenic-free solution" (Smith et al., 2000, p. 1097).

Use of surface water

Pond sand filter, Large scale water treatment

Surface water is concentrated often in ponds in Bangladesh. It can be treated with slow sand filtration known as pond sand filter. It is supposed to remove bacteria and turbidity

efficiently. Treatment of big surface water bodies is feasible only for large-scale water supply projects (Jigami, 2005, p. 299).

Alternative water resources

Hand-dug wells

Hand-dug wells have been one of the most used methods of groundwater withdrawal in the rural areas of developing countries, including Bangladesh (WaterAid, 2013a, p. 1). They are shallow, ranging from 5m up to 30m deep, dug by hand. They are cheap, can be built by locals, and generally have good yields. But they can be time-consuming, open to contamination if not protected, and limited for only certain types of ground/subsoil (WaterAid, 2013a, p. 1). In Bangladesh they have been mostly replaced by the tube wells in past 40 years. Still 1.3 million of Bangladeshi uses them (Moinuddin, 2004, p. 24). The dug wells have been found to contain only low levels of arsenic (Moinuddin, 2004, p. 24; BGS & DPHE, 2001 as cited in Ahmed, 2005, p. 289). But they cannot be built everywhere due to the subsoil limitations (Moinuddin, 2004, p. 24).

Deep tube wells

Building the deep tube-wells is one of the main options for arsenic-free water supply (van Geen, Ahmed, Seddique, & Shamsudduha, 2003; Yu, Harvey, & Harvey, 2003). It is most popular in the affected communities (Jakariya, 2003; Junaid, Goldar, Misra, & Jakariya, 2003). The safe water depth varies considerably though, even at the village level. Different researches placed it from 150m to 200–300m (van Geen et al., 2003).

Though popular, the deep tube wells have their disadvantages. They must be installed carefully to avoid the cross-contamination from the shallower aquifers (Smith et al., 2000, p. 1097) and monitored for the arsenic presence. The lateral and depth variations in arsenic concentration are not universally predictable. Then, the whole process of replacing the unsafe shallow tube wells with the safe deep ones is very expensive. Finally, the deep tube wells cannot be built anywhere (Moinuddin, 2004, p. 24).

Rainwater harvesting

Rainwater harvesting means “the immediate collection of rainwater running off surfaces upon which it has fallen directly” (WaterAid, 2013b, p. 1). The rainwater harvesting plants are relatively cheap and easy to build resources, with low maintenance costs and requirements. However, if poorly constructed or maintained, there is a danger of algal growth; of an invasion by insects or rodents; and of becoming a breeding ground for diseases (WaterAid, 2013b, p. 2). Since Bangladesh experiences the high amounts of rainfall, principally in the monsoon season, the major issue in rain water harvesting is storage. Water quality may deteriorate in time (Ahmed, 2005, p. 290).

3. The Response to Arsenic Contamination in Bangladesh

3.1 Government initiatives

Besides Cambodia and Nepal, Bangladesh is one of few the arsenic affected countries in Asia where the arsenic issue reached the national level of attention (WB, 2005a, p. 18). Since 1996, the GoB started implementing the arsenic mitigation programmes. They have been supported by a number of donor countries' and UN agencies, international and national non-governmental organizations (NGOs) (Milton, Hore, Hossain, & Rahman, 2012, p. 2).[4]

National Arsenic Policy and the Implementation Plan

The Inter-Ministerial Secretaries Committee on arsenic was formed by the GoB and chaired by the Principal Secretary. The National Committee of Experts, representing a multidisciplinary panel of specialists, was established to help the Secretaries Committee. These committees prepared the National Arsenic Policy and the Implementation Plan, both adopted in 2004 (Kabir, 2005, p. 3). To support the policy implementation and coordination among the stakeholders, the Local Government Division established the Arsenic Policy Support Unit (APSU) with funding of the UK's Department for International Development (DFID) (Kabir, 2005, p. 4).

The Policy seeks to identify the nature and extent of the problem through screening, patient identification, water quality testing and assessment of arsenic levels in the soil and agriculture products. It provides the guidelines for arsenic mitigation through public awareness, provision of arsenic-safe water supply, diagnosis and management of patients, and capacity building at all levels (GoB, 2004a).

According to the Policy, surface water should be preferred over groundwater and piped water supply is to be promoted when feasible. The Implementation Plan is even more explicit regarding groundwater. The deep tube wells could be used in the coastal areas where a deep aquifer had been well characterized. In other areas, including most of the highly affected zones, surface water or very shallow groundwater should be tried first (GoB, 2004b). Early mitigation efforts thus focused on technologies such as pond sand filters or hand dug wells. Though they tend to be arsenic-free, these resources are more vulnerable to other kind of contamination (Johnston et al., 2013, p. 1).

The Implementation Plan recommends mapping of the country's deep aquifer to ensure that the deep tube wells are not contaminated from the shallow aquifers (GoB, 2004b, p. 11). The debate in Bangladesh focuses on the dilemma whether deep groundwater should be used or not in the response to arsenic contamination. There is a risk of arsenic-contaminated water

[4] For the list of organizations and institutions involved in arsenic mitigation in Bangladesh see Annex 1.

leaking from the shallow to the deep aquifer. Moreover, it is not sure if the deep aquifer sediments will not release arsenic into the water at some point (WB, 2005b, p. 127).

The Plan defines three levels of the magnitude of arsenic contamination in each upazila, ward, or village: emergency, mid-, and long-term (see Table 3).

Table 3. Summary of emergency and mid-term response as defined in National Arsenic Policy (Jigami, 2005, p. 298; GoB, 2003b, p. 8–9).

	Emergency response	Mid-term response	Long-term response
Selection of villages	> 80% contaminated wells	< 80% contaminated wells	< 40% contaminated wells
Mitigation approach	Supply driven	Demand driven	The same criteria as under mid-term response. Should promote proven and sustainable technology options in the whole country, including piped water supply in the rural areas.
Service level	50 families/water sources	25-30 families/water source	
Cost sharing	Capital: no cost share Operation & Maintenance (O&M): borne by the users	Capital: by affordability O&M: borne by the users	
Site selection	Discussion between a supply agency and a community	Community's decision	
Institution arrangements	By projects and donors' accommodation, or by DPHE	By local government institution	

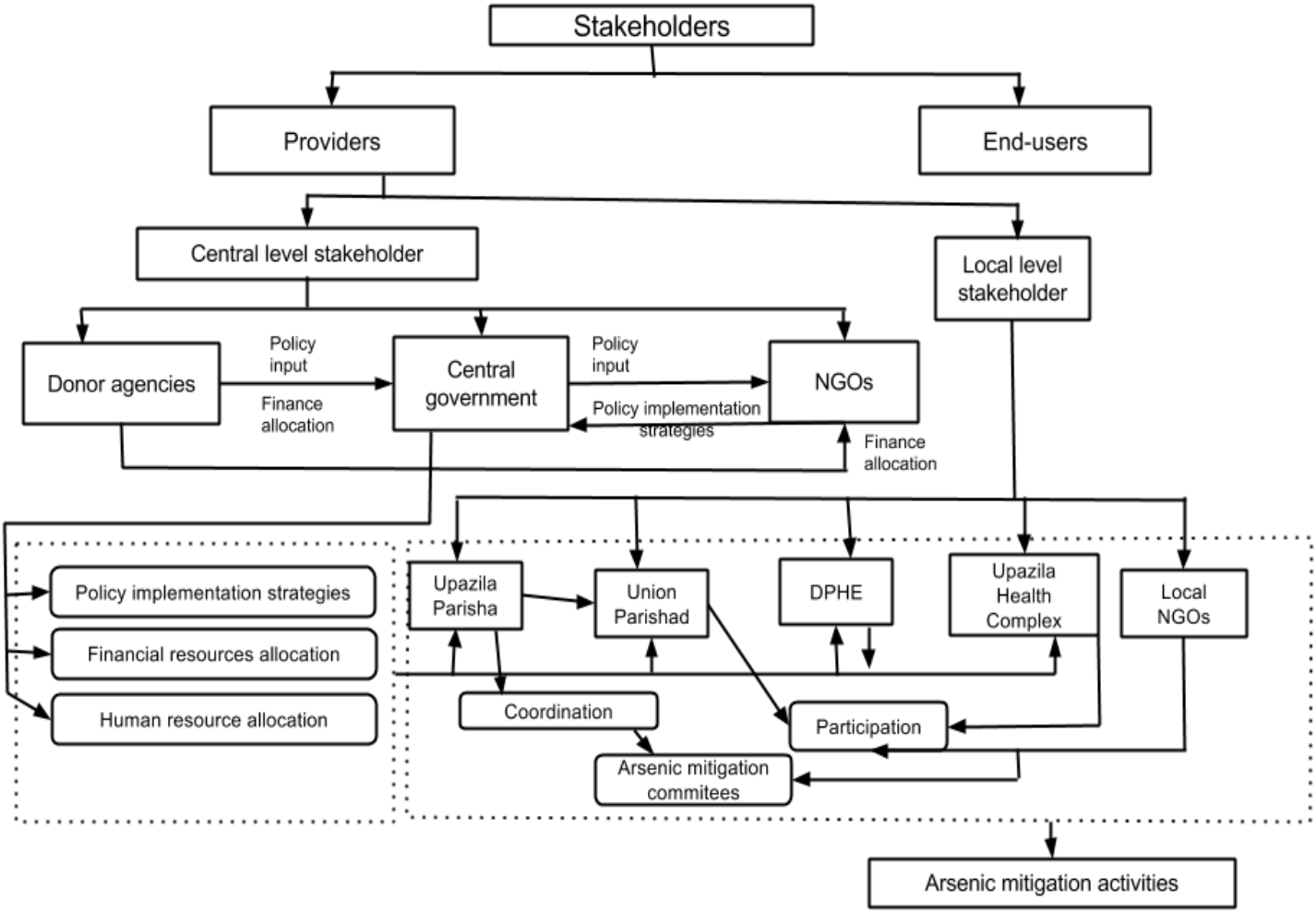
The Plan illustrates the difficulty of prioritizing the mitigation measures. The definition of emergency villages does not always provide a full enough picture on which to base the operational response. Eighty percent of tube wells contaminated with 60µg/litre may be less harmful than 70% of wells contaminated at an arsenic level of 200µg/litre (WB, 2005b, p. 134).

Government institutions

Generally, the central government provided policy support and allocation of budget. The local government got involved in distributing and installing safe water options. The local government also implemented limited water quality testing, patient treatment, and awareness-building in the arsenic affected communities (see Figure 5; Khan, & Yang, 2013, p. 495).

One of the main Bangladeshi government institutions involved in arsenic mitigation is the DPHE. The department belongs under the Ministry of Local Government, Rural Development and Cooperatives (MoLGRDC). It cooperates with a number of international donor agencies and local NGOs (Water Resources Planning Organization [WARPO], 2009, p. 3; Jones, 2000, p. 3).

Figure 5. Institutional stakeholders in arsenic mitigation (Khan, & Yang, 2013, p. 495).



The DFID funded the National Hydro-chemical Survey in all thanas of Bangladesh[5], conducted by the DPHE and British Geological Survey (BGS) (BGS & DPHE, 2001; Jones, 2000, p. 3). Other significant partners of the DPHE are United Nations Children's Fund (UNICEF) and WHO. They implemented screening and awareness-raising campaigns, technical expertise cooperation, and inter-agency coordination, respectively. Other partners include the WB, United Nations Industrial Development Organization (UNIDO), Food Agriculture Organization (FAO), or Danish International Development Agency (DANIDA) (Jones, 2000, p. 4–5).

Besides the MoLGRDC, the Ministry of Health & Family Welfare (MoHF), the Ministry of Water Resources (MoWR), and the Ministry of Science, Technology and Communication (MoSTC) are involved in arsenic-related work (Jones, 2000; Kabir, 2005). The Directorate of Health Services (DGHS) under the MoHF worked with UNICEF and WHO on arsenic

[5] Excluding Chittagong Hill Tracts.

patients screening and management (Kabir, 2005, p. 4). MoWR's projects include Bangladesh Water Development Board that undertook hydro-geochemical investigation of the deep aquifers (Kabir, 2005, p. 3); and The National Water Management Plan Project with the Water Resources Planning Organisation (WARPO), developing strategies to address the arsenic issue (Jones, 2000, p. 7). Under the MoSTC, Bangladesh Council of Scientific and Industrial Research (BCSIR) has run an environmental technology verification of the arsenic mitigation technologies (Kabir, 2005, p. 4).

The DPHE with funding of the GoB, the WB, Swiss Agency for Development and Cooperation (SDC) and other donors implemented Bangladesh Arsenic Mitigation Water Supply Project (BAMWSP). It is the national coordinating project on arsenic issue related to water supply. BAMWSP has aimed to coordinate the arsenic interventions. Its National Arsenic Mitigation Information Centre (NAMIC) is to collect, collate, and disseminate information on arsenic contamination (Kabir, 2005, p. 2; Jones, 2000, p. 3).

3.2 Non-governmental initiatives

A great deal of international, national, and local NGOs has been active in arsenic mitigation in Bangladesh. The non-governmental stakeholders, their donors, and the governmental bodies form a tightly interlinked and inter-dependent framework which is not easily identifiable. Major non-governmental stakeholders in the sector are NGO Forum for Drinking Water Supply and Sanitation (NGO Forum), BRAC, CARE, WaterAid Bangladesh, World Vision Bangladesh (WVB), Village Education Resource Centre (VERC), Asia Arsenic Network (AAN), Arsenic Crisis Information Centre (ACIC), NGOs Arsenic Information and Support Unit (NAISU), International Development Enterprises (IDE), Grameen Bank, and Dhaka Community Hospital Trust (DCH) (Kabir, 2005; Jones, 2000; NGOs Arsenic Information & Support Unit [NAISU] & NGO Forum for Drinking Water Supply & Sanitation [NGO Forum], 2003).

3.3 Funding

The key donors of arsenic-related work are: the WB, UNICEF, WHO, United Nations Development Programme (UNDP), SDC, Swedish International Development Agency (SIDA), Australian Agency for International Development (AusAID), DANIDA, Japanese International Cooperation Agency (JICA), Canadian International Development Agency (CIDA), United States Agency for International Development (USAID), DFID, Rotary Club, and National Institute of Environmental Health Sciences (NIEHS) (Kabir, 2005, p. 5; Jones, 2000).

3.4 Research initiatives

The Bangladesh University of Engineering and Technology (BUET), Dhaka University, Jahangirnagar University, Rajshahi University, Columbia University, Texas University,

Cornel University, Harvard University, London School of Hygiene and Tropical Medicine, CIMMYT United States Geological Survey, and the BGS have conducted "some critical research into the source of contamination, alternative safe water supply options and characterisation of the Pleistocene aquifer" (Kabir, 2005, p. 5).

3.5 Screening

Globally, Bangladesh carried out the only large-scale program of screening arsenic contamination (WB, 2005a, p. 24). The first nationwide survey of approximately 23,000 tube wells was done in 1997, by the DPHE and UNICEF. The survey used field test kits. In 1998–99, the DPHE and BGS analysed a subsample of water samples that confirmed arsenic contamination. The largest water quality screening was conducted by identifying initially 270 upazilas in 2000–2006 and testing over 5 million wells (Milton et al., 2012, p. 2–3). The testing was funded by UNICEF (UNICEF, 2008, p. 3).

Bangladesh is also one the only arsenic affected country planning monitoring of the screened tube wells. The Implementation Plan of National Arsenic Policy makes provision for monitoring of 2% of the safe tube wells every six months (GoB, 2004b, para 3.1). However, the Plan does not specify which testing or what procedures should be used to ensure the reliability of water quality analyses (WB, 2005b, p. 108–109).

In Bangladesh the decision to adopt blanket screening[6] was based on the heterogeneity of the aquifers, which means that a base sample screening would not accurately represent the level of arsenic contamination (WB, 2005b, p. 110). One of the lessons learned in Bangladesh is that if a well is not tested in a contaminated area and if people do not have any convenient alternative solutions, they will use the well assuming that if it has not been tested then it should be safe (WB, 2005b, p. 112).

3.6 Awareness

The awareness campaigns on recognition of the safe tube wells took place in Bangladesh[7] through the physical marking of safe or contaminated tube wells, accompanying arsenic screening (WB, 2005b, p. 113). The safe wells were marked green and the contaminated ones red. The problem is that the choice of red to indicate arsenic contamination was sometimes confused with iron precipitation, which leaves an orange-red colour (Hanchett, Nahar, van Agthoven, Geers, & Rezvi, 2002, p. 397; WB, 2005b, p. 114).

The focal point of arsenic awareness campaigns is the tube well testing: while waiting for the results, a field worker had time to talk to the people about the issue. In the end, the people

[6] Blanket screening is the one when all tube wells in a given region are tested, whereas a base sample screening tests only a selection of wells and from that data conclusions are drawn as to the levels of contamination in the other tube wells.

[7] Other countries where the safe tube wells are marked are Cambodia, Nepal, Pakistan, and West Bengal in India (WB, 2005b, p. 113).

could visually see the result (UNICEF, 2008, p. 3). The awareness programs proved to be very effective also through conducting the participatory sessions such as upazilas, union or courtyard-level meetings, tea stall sessions, school awareness programs and rallies, or mobile film shows (Kabir, 2005, p. 57).

Even though according to the different studies the knowledge of arsenic has increased and the attitudes have improved, more complex matters related to arsenic stay unknown. Moreover, the gained information is not directly translated into practice (Kabir, 2005, p. 46). Awareness differs from a village to a village; the highest one being in the villages with most arsenic-affected people. Along with awareness, the rate of people switching to the safe water resources varies. Effective campaigns, involving community and using community specific, mobilization and motivational methods, are needed to ensure that the people no longer use the arsenic contaminated resoures (Kabir, 2005, p. 56; Khan & Yang, 2013, p. 480; WB, 2005b, p. 114).

UNICEF developed and implemented an extensive, comprehensive communication strategy and campaign on arsenic issue (Jones, 2000, p. 9; UNICEF, 2008, p. 3), including the communication tools for a broad range of field workers (UNICEF, 2008, p. 3). BAMWSP drafted the information packages to increase awareness of water quality (WB, 2005b, p. 113). In 2005, total of 25 various organizations and institutions had engaged in awareness-raising from the local to the national level in 60 projects and programs. Some of their activities overlapped (Kabir, 2005, p. 42).

3.7 Patient identification and management

Identification of the arsenicosis patients has been often done during the tube well screening in Bangladesh. Most of the identification has been based on the skin-related symptoms (WB, 2005b, p. 113) which might underestimate the actual number of patients. Some studies indicated that even people without skin lesions and other symptoms can have high concentrations of arsenic in the samples of their hair, nails, and urine. However, the laboratory analysis of the samples is very expensive (WB, 2005b, p. 116).

One of the most important aspects to count with during tube well screening and patient identification in Bangladesh is gender sensitivity. For example, the teams engaged in the screening surveys included at least two females (WB, 2005, p. 117). Doctor absenteeism is another important aspect. A recent study conducted in Bangladesh estimated doctor absenteeism to be around 75% in rural areas (Chaudhury & Hammer, 2003 as cited in WB, 2005, p. 121)

The organizations and institutions that have been involved in patient identification are DCH, DGHS, BRAC, CARE, or NGO Forum. Funding was provided particularly by the GoB, WHO, and UNICEF (Kabir, 2005, p. 47). The GoB (2004b, p. 13) designed and approved a protocol

for case identification and management, based on the regionally accepted protocol developed by the WHO. Training of health workers at the different levels around the country was emphasised (Kabir, 2005, p. 50).

3.8 Alternative safe water supply options

In 2005, total of 18 organizations and institutions had been involved in provision of alternative water supplies through 47 projects and programmes. The organizations have worked with different alternative water supply options: dug wells, pond sand filters, river sand filters, arsenic iron removal plants, and deep tube wells (Kabir, 2005, p. 30). The arsenic removal technologies have been developed within the country while others were imported. The BCSIR, under the CIDA funding, have verified the technologies through the environmental technology verification programme (Kabir, 2005, p. 4).

The numbers of alternative water supply options stated to be installed in Bangladesh differ. Kabir (2005, p. 40) states that almost 107,000 alternative water supplies have been installed in arsenic affected areas, serving 38% of the total households in the areas.[8] Ravenscroft, Brammer, and Richards (2009) reached the same number. Most commonly, deep tube wells, rainwater harvesting plants, and dug wells have been installed (Kabir, 2005, p. 39).

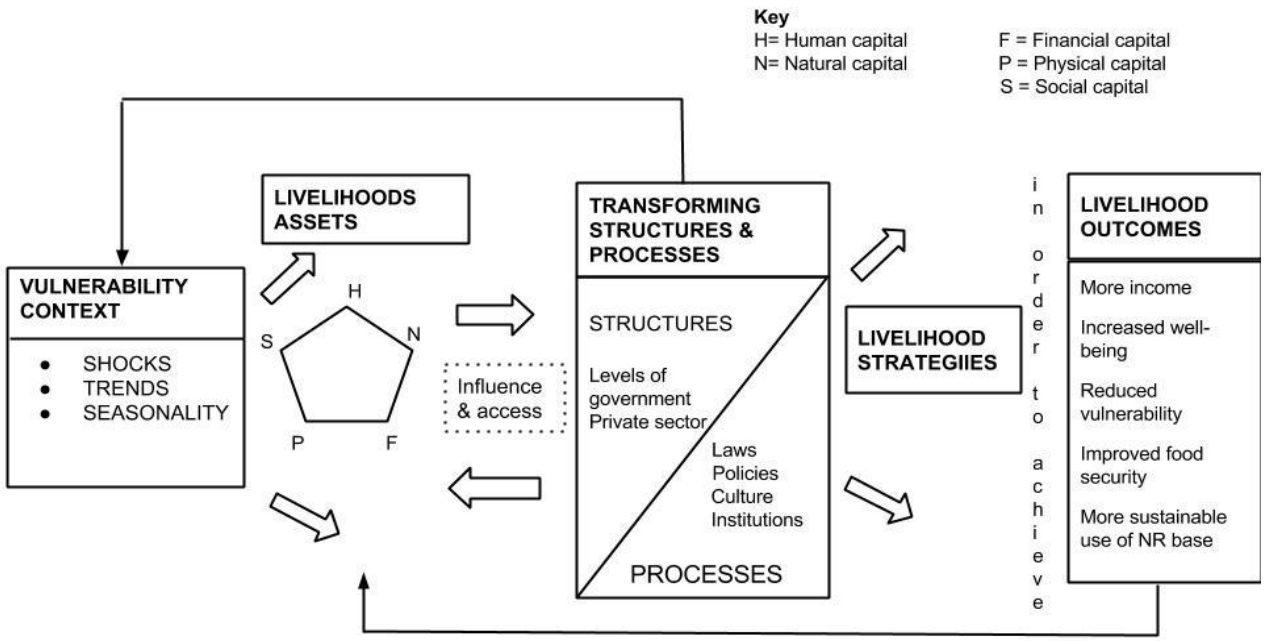
Provision of the mitigation options has faced several challenges. Inauen et al. (2013, as cited in Johnston et al., 2013, p. 480) found that only 62% of households with access to the safe water options actually used them. The feasibility, effectiveness, and acceptance of the safe water options available vary from place to place (Kabir, 2005, p. 57). Willingness to pay and willingness to walk (WB, 2005b, p. 132; Johnston et al., 2013, p. 479), alongside with self-efficacy influencing water quality and social factors such as the number of people using safe water options[9] or social conflicts (Johnston et al., 2013, p. 479; Milton et al., 2012, p. 5) are major factors playing role in using the arsenic-free options. Other concerns are the health risk substitution and the unsatisfactory characteristics of each mitigation technology. Water quality can be affected by the microbiological contamination. Lokuge et al. (2004, p. 1172) and Kabir (2005, p. 57) argue that switching to faecal-contaminated, unimproved sources could actually increase the burden of disease.

[8] Assuming that the expected usage of 50 households per option noted in the emergency phase is used for all options except for the arsenic iron removal plant (for which 10 is realistic) and rainwater harvesting (which are assumed to be for an individual household) (Kabir, 2005, p. 40).
[9] I.e. the descriptive norm (Cialdini, 2003).

4. Sustainable Livelihood Framework

While designing and applying data collection methods as well as analysing data in the research, I was deriving from the so-called Sustainable Livelihood Framework (SLF), especially from its notions of different Livelihood Assets influenced by the Vulnerability context and the Structures, Policies, and Processes. The SLF, based on Sustainable Livelihoods Approaches, is a framework developed and adopted by the DFID. It is one of the most widely used livelihood frameworks in the development practice (GLOPP, 2008, p. 1). It is a tool that helps to understand the peoples' livelihoods, especially of the poor (Department for International Development [DFID], 1999, section 2.1).

Figure 7. Sustainable Livelihood Framework (DFID, 1999, p. 1)



The SLF illustrates main components of and influences on the livelihoods and typical relationships between these. It defines five core asset categories or types of capital upon which the livelihoods are built: *Human*, *Natural*, *Financial*, *Physical*, and *Social capital*. People require and draw on these *Livelihood Assets* in order to achieve their objectives or *Livelihood Outcomes*, using the chosen *Livelihood Strategies*. Both are shaped by the *Transforming Structures and Processes* which also influence the assets. All is operated within and interlinked with the *Vulnerability Context*.

Livelihood Assets are understood as the people's strengths, their capitals, but not in an economic sense. Human Capital represents the existing capacities of people such as their level of education, health base, or knowledge base. Natural Capital means the biophysical elements: water, air, soils, sunshine, woodlands or minerals. Financial Capital entails the

money and cash investments available, savings, credits, income remittances and access to credit. Physical Capital involves the infrastructure such as roads, buildings, water supply system, equipment, transport, and telecommunication. Social Capital implies the social and institutional networks: formal and informal associated links such as family or friends.

The structures of government and private sector and processes of laws, institutions, culture, and policies shape the livelihoods. They determine the access to capitals, strategies, decision-making bodies, and the sources of influence. They also determine the terms of exchange between the capitals and returns to a given livelihood strategy. Livelihood Strategies are the ways of achieving the livelihood goals or Outcomes. The Strategies are evolved in a dynamic process. People combine the diverse activities to fulfil their various needs at the different times. We need to count with the Vulnerability Context as well, which emerges when people have to face a harmful threat or shock with an inadequate capacity to respond effectively.

Besides for planning the new development interventions, the framework can be used for assessing the contribution to the livelihood sustainability made by the existing activities (DFID, 1999, section 2.1). The framework can be understood as a tool or checklist to understand poverty in responding to the poor people's views and their own understanding of poverty. Its application is flexible and adaptable to the specific local conditions and to the objectives defined in a participatory manner (GLOPP, 2008, p. 1–2). Though there are some core principles that can be identified within the framework: focus on people, holistic view, dynamicity, building on strengths, macro-micro links, and sustainability (Kollmar & St. Gamper, 2002, p. 3–4).

The SLF has several advantages. It is flexible and its potential applications are manifold. It can be used in the various contexts and in the different ways. The approach is not restricted only to the livelihood thinking, as it includes the ideas of other recent theoretical approaches (Kollmar & St. Gamper, 2002, p. 9). It builds on the strengths of people, not their weaknesses or limitations. Its inherent implication is participation. People should be involved and respected when using the framework (GLOPP, 2008, p. 2).

However, the SLF has also its limitations. It can be mistakenly perceived in a linear manner or as a model of reality, whereas the actual relationships between the factors are much more complex (DFID, 1999, section 2.1.). Reducing the livelihood perspective to a methodological tool contains the risk of looking at two things interchangeably. Its holistic view implies the amount of information that can be hard to cope with. Using the framework requires resouces that might not be always available. Additionally, improving the livelihoods of a one group can negatively affect the livelihoods of the other. This may lead to a normative dilemma on the decision about what to consider with priority (GLOPP, 2008, p. 5).

5. Community development

Community development has no firm, precise and generally agreed upon meaning. Although no generally accepted definition has been developed, the ideas about community development crystallized into what is now accepted as the approaches towards poverty eradication (de Beer & Swanepoel, 2011, p. 34). Cox and Pawar (2006, pp. 98–101) see community development as one of the basic strategies for international social work. Moreover, community development potentially incorporates all of these strategies as an integrated response to a wide range of situations.

Campfens (1997, p. 448–462) basically agrees with de Beer and Swanepoel (2011) in defining community development. He says it is commonly regarded as empowering, involving capacity building, focusing on self-help and self-reliance, and concerned with questions of social cohesion. Campfens also adds the element of income-generation strategies which are either facilitated or utilized in community development work. Generally, community development is a basic tool for achieving social development (Stoesz et al., 1999, chap. 7). It is commonly included in the post-conflict reconstruction, in a displacement context and is a key strategy in poverty alleviation. There is hardly an aspect of international social work in which community development does not potentially play a vital role (Cox & Pawar, 2006, p. 98).

Approaches to poverty eradication and strategies within community development vary.[10] However, there are certain common principles which apply to what is known as community development and which give essence, even shape, its features and outcomes. It is important to keep in mind that the heterogeneous community-level development practices occurring around the world can be, while using a similar language such as mobilization, linkages for change, partnerships, or cooperation, entirely dissimilar (Campfens, 1997).

I present here the analysis of what community development means by de Beer and Swanepoel (2011, pp. 41–59). It is easily comprehensible and clear, yet detailed. Moreover, it corresponds with the perspective I hold as an evaluator.

Community development features:

1. *Integrated approach*

An integrated approach is the most fundamental characteristic of community development (Monaheng, 2000, p. 127). First, the issues of poverty and development are multidimensional and they should be tackled together in a coordinated fashion. Second, there are many different role-players in the interventions striving for community development. Their efforts should be coordinated as well.

[10] Other approaches within community development include Assets-Based Community Development (ABCD), Community Asset Mapping Program (CAMP), or SEED-SCALE.

2. *Collective action*

Community development involves a collective action. A group of people that share a mutual problem, need, sentiment or concern act together and share responsibility for their actions. Sometimes the group that formed may be small but since people have the right not to participate, it means the freedom of the individual was respected. The individual inputs to the group action are important as well because they enable the group to grow.

3. *Needs orientation*

Community development should be based on people's needs in order to create commitment in them. Community members themselves ought to identify their needs, not an outsider, before any project begins. The needs that are not heartfelt will not make people take action. The identification of needs is therefore a prerequisite for action (Adejunmobi, 1990, p. 226). It is a participatory process which needs to be realized carefully. There are risks involved such as a lack of ownership, encouraging the negative self-perceptions that people have and raising the unrealistic expectations. Finally, the needs ought to be defined clearly. "A project that is not perceived or understood by the people is a dead project" (de Beer & Swanepoel, 2011, p. 42).

4. *Objective orientation*

Each objective that addresses the identified needs must be precise and concrete. Precision is necessary because a project cannot have a vague objective. If we wanted to build a school, we would have to know where the school would be located, for whom it would serve or who would teach there. Concreteness helps people to understand what they aim for and to take action. The perceptions are influenced by people's values and norms. An abstract objective such as 'better life' interpreted by each person differently will make collective action very difficult.

5. *Grassroots level*

Grassroots orientation means that ordinary people are supposed to have the leading part in community development. The government officials, experts and other stakeholders facilitate the whole process. They do not "keep the people busy by involving them in worthwhile actions." Because the community development activities are grassroots-oriented, they are "small, simple and address the basic needs of those at this level" (de Beer & Swanepoel, 2011, p. 44).

6. *Assets-based*

Community development builds on the assets of people that are at disposal. Such assets need to be identified as well as the needs. The assets can be of a natural or physical origin but the

most important are the abilities of actual human beings. The more used the abilities are, the more they improve. This is what makes community development and its management different from any other approach.

7. *Democratic*

The concept of community development emphasizes the role of a local government. A community and orientation on its development form a part of the local government's planning and actions. Community development, however, goes beyond the traditional government structure. It gives an opportunity to participate in the democratic actions to the most deprived, isolated, and vulnerable people, thus enabling them to use their democratic rights.

The successful community development activities lead to:

1. *Awareness*

Community development generates a special kind of awareness. People become aware of themselves, their needs, assets, and resources. Such awareness increases self-consciousness and the ability to take action.

2. *Further development*

Community development projects often trigger further activities leading to further development. The projects continue in various forms through confidence and optimism that people gain after completing a task set by themselves. The initiatives also go on through the management and maintenance of what was established through the project.

3. *Demonstration effect*

Successful community development projects broadcast their effect over a wide area. "A successful project demonstrates to all that people who stand together and work together can bring about changes that will make a difference" (de Beer & Swanepoel, 2011, p. 46). Besides the physical results, the project has a significant psychological effect not only on the people involved in it but on the outside observers as well.

4. *Learning*

Learning is an inherent part of the community development projects. It is multidimensional. The people who participate in the projects learn different skills such as management, communication or technical skills.

5. *Community building*

Community development strengthens a community both at the abstract and practical levels. People become more self-reliant and self-sufficient which enforces their dignity. They also

gain practical skills such as the ability to organize themselves effectively. Community development enhances leadership and the institution building, through capacity building and forging new linkages among the stakeholders.

5.1. Ethical and practical principles

Thousands of people call themselves the community development workers (CDW), doing 'development work' in the impoverished areas. As de Beer and Swanepoel (2011, p. 48) point out, "These people do not come into this job with same point of departure, following the same set of rules or moving within the same parameters." A universal set of principles at the ethical and practical level is needed to "bring some order to this chaos."

The authors (2011, pp. 48–59) further name this set of principles:

Ethical principles

1. *Human orientation*

CDWs should never separate the physical needs of people from the abstract human needs. Happiness, self-reliance or dignity is as important as food or clean water. Practically, these needs cannot be stated as the objectives because people are concerned with the concrete issues. However, whatever subtle these needs may be, they should not be neglected.

2. *Participation*

People should participate in all aspects of the community development projects. Participation should not mean only involving the people within a pre-scribed framework, as it often does. Participation is necessary because it brings about the local knowledge base and a sense of kinship. In a radical view, participation leads to equity. It gives the people a power to fulfil their rights of the democratic citizens.

3. *Empowerment*

One of the primary roles of CDWs is to empower people. Empowerment means to give people the power or right to make decisions. It also means to support them by providing the necessary knowledge and skills to make good decision-making possible.

4. *Ownership*

CDWs mobilize people to take up the responsibilities of ownership, to accept these and to manage their future through their projects. This view is in the opposition to the one that some development agencies hold, regarding the projects as their property. Even though ensuring the sense of ownership among people is not an easy task, it can bring longevity and sustainability.

5. *Sustainability*

Community developments projects ought to be sustainable. If we harm the environment we are living in, we harm ourselves. Sustainable community development needs to occur at the grassroots level, building on the local context with its unique dynamics and on the indigenous strategies of the locals (see chapter 4).

6. *Release*

According to de Beer and Swanepoel, the real goal of community development is to release people from the deprivation trap of poverty. It should not be just about addressing poverty or some manifestations of it. Providing some relief or improvement is only a temporary solution and it makes people more dependent on their benefactors. It does not free them. "If the whole person is to be the target of development, and if development aims to meet his/her abstract needs of self-reliance and dignity…then it must be more than a relief operation" (de Beer & Swanepoel, 2011, p. 55).

Practical principles

Community development should be transforming and releasing which requires likewise action. The appropriate actions are just as important as the appropriate policies. In order to follow the ethical principles you need to stick to the certain practical ones.

1. *Learning*

All stakeholders learn during the community development activities, from the ordinary people to the government institutions and NGOs. Learning occurs as the activities go along. The non-negotiable, pre-selected project frameworks inhibit the learning process. Participation of the people and flexibility and compassion of CDWs bring about learning.

2. *Compassion*

CDWs need to have a wide range of skills but the most important one is compassion. All their actions should contain empathy. Human dignity and happiness should be uppermost in their minds.

3. *Adaptability*

If the principle of learning is followed, to be adaptive is literally the only choice there is. Adaptability is the contradiction to the so-called blueprint planning which is technical, clean, precise, but inflexible. "Adaptive administration encapsulates bottom-up decision-making participation by communities and an improved responsiveness, creativity and innovative ability of institutions" (de Beer & Swanepoel, 2011, p. 58).

4. *Simplicity*

Finally, as Chambers (1977, pp. 5–7) proves, the notion 'the bigger and more complex, the better' is not right. When the opportunity for learning and participation is curtailed, the very humanistic nature of development is jeopardized. 'The big project trap' leads to a lack of adaptability, and the learning and releasing processes can hardly take place. Large projects need to be broken down into the smaller pieces. Community development seeks simplicity and avoids complexity.

5.2 Community

A community can be approached as a value or as a descriptive category or set of variables (Smith, 2001). In the community development practice, the communities are usually defined in terms of the geographical location, interest, and deprivation. I also present here the third approach of a communion. Finally, when discussing a community, we cannot forget the factor of time.

First, defining a community in the terms of geography implies the community shares a common place. A community is then "…a grouping of people who reside in a specific locality and who exercise some degree of local autonomy in organizing their social life in such a way that they can, from the locality base, satisfy the full range of their daily needs" (Edwards & Jones, 1976, p. 12).

Second, a community can be identified in the sense of shared common interests and concerns: The community exists when a group perceives common needs and problems, acquires a sense of identity, and has a common set of objectives. People share a common characteristic other than place, linked together by the factors such as religious belief, sexual orientation, occupation or ethnicity because of which they might be disadvantaged in the society (Smith, 2001).

Third, a community as communion represents a sense of attachment to a place, group or idea. In other words, there is a 'spirit of community.' In its strongest sense, the communion implies a profound meeting or encounter – not just with the other, but also with God and creation.

Defining a community; be it on the basis of a common place, interest or attachment; implies the factor of time. A community exists long-term. For example, when taking a bus, people share space together, but do not represent a community.

These categories can overlap. Place and interest communities may well coincide as in the case of places where most of the people living there work in the same field (Smith, 2001). A community is special, living entity and as well as its people, it goes through continual

changes. It interacts with its own individuals, its environment, and other communities (Brokensha & Hodge, 1969 as cited in de Beer & Swanepoel, 2011, p. 61).

De Beer and Swanepoel (2011, pp. 61–63) view the community as the group of people who are concerned and participate in a community development project. They do not represent the whole community. The whole community cannot even be represented––"all individuals of given community will never be in close association with a project." This has various reasons: some do not share the concern; some believe nothing can be done about the concern; or they do not share the sense of attachment to the community.

The authors further argue that the community as a role-player in community development should be mobilized to do, rather than prompted to receive. If the community does not play the main part, the principles of community development are discarded. This has a lot to do with the notion of participation.

5.3. Context of community development

5.3.1 Poverty

It is important set the concept of community development into the context within which it takes place and with which it is interweaved. One of the biggest challenges today is poverty. One third of people are somehow affected by poverty (Cox & Pawar, 2006, p. 161). Poverty alleviation or eradication is number one objective of the worldwide development efforts[11], including community development as one of the strategies to tackle it.

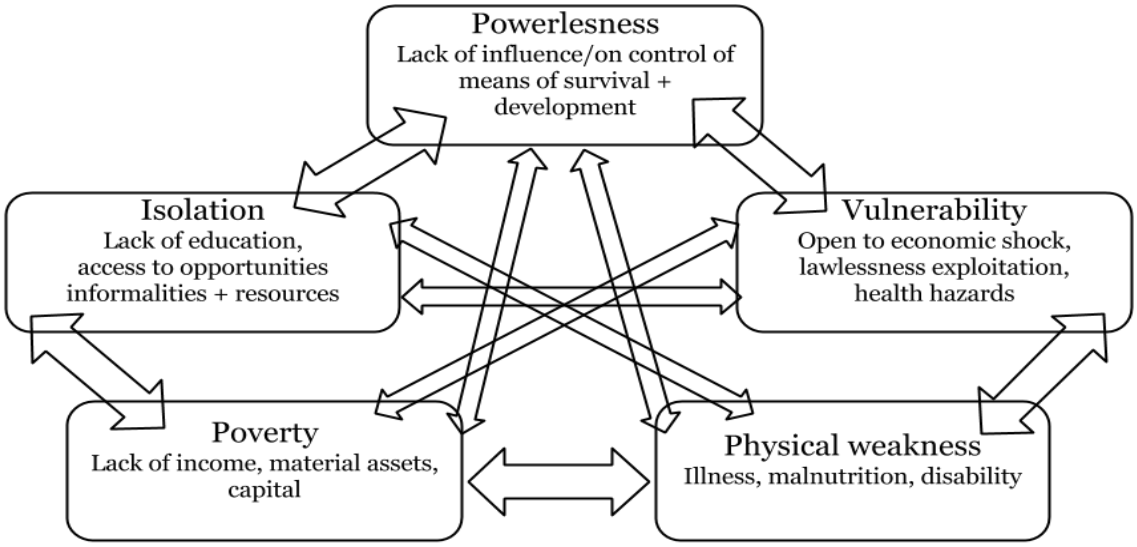
However, poverty is not easily definable. It is a complex issue that is interpreted in plenty of ways. Basically, there is a broader, multidimensional or narrower notion of poverty. The latter sees poverty mainly as a lack of income. The former takes into the notion of poverty a lack of higher needs such as a lack of health, dignity, love or security or as the capability deprivation (Sen, 1983). It is beyond the scope of this thesis to embrace all approaches to poverty. However, what is important in relation to community development as defined in this paper is the so-called the deprivation trap.

The deprivation trap of poverty, otherwise called the poverty trap or the cycle of poverty, as developed by Chambers (1983, p. 111), shows us the different factors or "clusters of disadvantage interlock." These clusters are interlinked together and prevent people from breaking off this cycle or trap. CDWs are to understand the characteristics of the deprivation trap as well as look beyond, at the positive assets people own (de Beer & Swanepoel, 2011, pp. 6–7). The ultimate goal of community development should be to release people from the

[11] Poverty eradication is the first goal of Millennium Development Goals which were set at the Millennium Summit of the United Nations in 2000.

deprivation trap of poverty. To alleviate poverty is not enough because it is only a temporary solution (de Beer & Swanepoel, 2011, p. 55).

Figure 6. The deprivation trap of poverty (based on Chambers, 1983, pp. 111–114).



5.3.2 From ill-being to well-being

To be poor means to suffer from ill-being. To move to well-being is not just about obtaining money. It has been a subject of discussion what influences and constitutes ill and well-being. Besides the good emotions, people need a sense of individual vitality in order to experience well-being. They need a stock of inner capacities to help them to be resilient; they need to undertake the meaningful activities and to feel a sense of relatedness to others. Well-being is of the dynamic nature that gives people a sense of how their lives are going, through the interaction between their circumstances, activities, and psychological resources or 'mental capital' (NEF, 2009).

Narayan, Chambers, Shah, and Petesch (2000, pp. 25–37) identify at least five dimensions of ill-being and well-being (see Table 4). Ill-being portraits a person or community in the deprivation trap. Conversely, well-being shows a person or a community after breaking off the trap (de Beer & Swanepoel, 2011, p. 11).

Table 4. Dimensions of ill-being and well-being (Narayan, Chambers, Shah, & Petesch (2000, pp. 25–37)

Ill-being	**Well-being**
Material lack and want: of food, money, shelter and other livelihood assets	Material well-being: enough of livelihood assets
Physical ill-being**:** hunger, pain, discomfort, exhaustion	Bodily well-being: good health, appearance, physical condition
Bad social relations**:** exclusion, rejection, isolation, loneliness	Social well-being: ability to care for children, maintaining self-respect and dignity, living in peace and harmony with others
Insecurity, vulnerability, worries, and fear**:** stress, risks, defencelessness	Security: civil peace, physical safety, secure environment, access to justice
Powerlessness, helplessness, frustration, and anger: political impotence	Freedom of choice and action in all aspects of life

5.4 Participatory approaches and methods

The qualitative evaluation study presented in this thesis used some of the principles and methods of participatory approaches. It is therefore important to look into the notions of participation, participatory approaches, and the methods they use.

'Participation' and participatory approaches first emerged in foreign aid in the 1970s as a reaction to the existing top-down, malfunctioning projects that did not correspond with the reality (Chambers, 1983). These approaches are based on the involvement of the affected communities into the project cycle. The success of any foreign aid project depends upon the understanding of and ability to react to the needs of a community. Effective participation demands deep understanding of a context and natural links. It uses the existing institutions and structures to organize the issues of cooperation, ownership, and accountability.

Participatory approaches mean the shift from verbal to visual, from measuring to comparing, from frustration to fun, from centralization to local management, from top-down to bottom-up, from enforcement to empowerment. Such approaches should be adaptable to the changing realities, pertinent, appropriate, and sustainable. They should involve the education/learning processes, empowerment, and capacity building of the communities (Ley, 2013, p. 1–4). As a result, there should be a smaller risk of inadequately provided aid, the relationships and partnerships installed equally, and the communities empowered.

Participation is linked with the rights-based approach to aid––it is one of the basic rights of the participants of development (John, 2010, p. 1–2). However, people also have the right not to participate. Using a participatory approach requires a good assessment. We need to answer the questions such as 'Who participates?', 'Under what conditions?', 'In which setting?', 'When and how to participate?' The preconditions need to be met to start with

participation: Do people want to participate and conduct the process? Are they able to do it? Are they committed to action and its consequences? (Ley, 2013, p. 3).

The participatory approaches have been applied to the versatile fields: local government budgeting, rights-based approaches to development, downward accountability, intra household gender relations agricultural extension and research, monitoring and evaluation, or workshops, learning and teaching (Chambers, 2006, p. 2). The approaches with its principles have been widely used in research as well. Some examples include Participatory Action Research, Community Based Participatory Research, Community Engaged Research, or Ethnographic Participatory Research.

Participation can become a tool or an objective in foreign aid. A ladder of the different levels of, roles, and responsibilities in participation has been established. Such hierarchy or distinction applies to the research activities as well (see Annex 2.). The participatory methods (PMs) that are used in the foreign aid interventions and in research are almost interchangeable as well.

One of the most used PMs are the different kinds of participatory mapping, nowadays followed by the Participatory Geographical Information Systems. Other widely used PMs involve the seasonal calendars, community-history timelines, Venn diagrams, matrixes, problem trees, or community action plans. The PMs also include the traditional, yet somewhat altered research methods of interviews and focus groups. The PMs are adequate especially for gaining the qualitative data (Schmied, 2007, pp. 27–38). All of them reflect on the principles of participatory approaches.[12]

Participation and the participatory approaches are not a panacea. They have received much criticism for being used only as token or a label; for actually leading to the unjust and illegitimate use of power instead of empowerment of the locals; and for bringing more inequality that equality (see Cooke & Kothari, 2001). Similar indications have been found also in arsenic mitigation practice in Bangladesh (see Sultana, 2009). The functional limitations, the local context of culture and power relations, and the external power and control limit the participatory approaches and their methods.

The participatory approaches represent only a tool in foreign aid which is imperfect as any other. Their use depends on the people and institutions dealing with them. The important thing is not to forget the human criteria such as the common sense, respect, and trust (Hailey, 2001).

[12] Participatory mapping is further explained in the section 7.4.3.

5.5 Community development and Sustainable Livelihoods Framework

The SLF and sustainable livelihood approaches in general do not seem to have embraced much of the methods and practises of community development. Simply looking at the Sustainable Livelihoods Guidance Sheet by the DFID (1999, section 2.3), we see that the terms 'community' and 'community development' are infrequent. The community emerges as "a level for" and "the context of" an intervention. The local knowledge is categorized under the Human Capital. Emphasis on the levels and context shows that the sustainable livelihood practices reflect and reinforce the group mobilization as the vehicle for change, without regarding the social dynamics behind the group formation (Brocklesby & Fisher, 2003, p. 190).

Although the SLF is thought of as people-centred (Kollmar & St. Gamper, 2002, p. 3–4) and as being inherently participatory (GLOPP, 2008, p. 4), Brocklesby and Fisher (2003, p. 191) doubt that. They state that "reference to communities, or the drawing of community-level ideas connected to participation cannot be equated with a carefully considered community development strategy or community development practice."

Brocklesby and Fisher (2003, p. 194) suggest that community development might be missing from the sustainable livelihood approaches for two reasons. First, it is difficult for the externally-driven SLF to systematically incorporate the locally situated community-level practices. Second, the SLF is embedded in the northern technocratic discourse, focusing on the technical nature of development. It ignores or rejects the transformative aspirations and principles which underpin the current community development practice.

Although the SLF and community development have not been extensively connected in practice so far, they can become complementary. The principles of community development can bring to the SLF the locally situated character and true participation of people which treats them as partners and draw on their local knowledge. The SLF puts the community-level activities into the context of transforming Structures, Policies, and Processes, linking the micro- and macro-level of development. Finally, the SLG might serve as a common ground to bring together the locals, community workers and other practitioners, and policy-makers to develop the projects that are good from all perspectives (see Brocklesby & Fisher, 2003, p. 194–196).

6. Role of the community in arsenic mitigation in Bangladesh

Community-based and region-specific approaches are considered to be essential in the successful implementation and sustainability of not only arsenic mitigation work, but also in the water resources management and public health projects in general. The failure of arsenic mitigation in Bangladesh is attributed to a lack of comprehensive and participatory approaches. Such approaches would allow the affected communities to express themselves and to have a sense of ownership (Alaerts & Khouri, 2004, p. 20, 38; Khan & Yang, 2013, p. 500).

The arsenic mitigation activities cannot be done without the local people. The degree of community involvement, however, differs from place to place, from project to project. The evidence of exclusively community-driven awareness activities has not been found. It seems that the affected communities in Bangladesh have been largely seen as the objects of arsenic mitigation work or as the contributors at best.

One of the examples of how community involvement and participation actually work in arsenic mitigation is BAMWSP, one of the largest governmental projects. Officially, the organised affected communities or community-based organisations (CBOs) were part of decision-making process of investments but their involvement was de facto limited. Monitoring was carried out on the completely different levels than the finances go through. Communication was most likely to occur only among the people who hold power––the government officials linked with the contractors, the local elites and influential union chairmen (Rammelt & Boes, 2004, p. 4).

It seems that more than people's lack of willingness or commitment, it is their lack of access to the socioeconomic resources, bad governance, and the problematic implementation of projects that prevent further involvement and participation of the communities in arsenic mitigation in Bangladesh (see Atkins, Hassan, & Dunn, 2007, p. 158, 166; Khan, & Yang, 2013, p. 496; Rammelt & Boes, 2004, p. 4–5; Sultana, 2009). However, the paradigms, such as participation or empowerment, connected to the community and its development are not without flaws. Their unconsidered application can often do more harm than good.

Sultana (2009, p. 357) surveyed the role of community and participation in water management on the case study of arsenic mitigation in Bangladesh. She indicates that the community projects increase the differences and inequality. They do so through their rules of membership, distribution of costs and benefits from community involvement and from the level of contamination in a locality. Furthermore, she suggests that the social power relations arising in the project often result in the marginalisation of the locals. The people are marginalized on the basis of their class and gender, and the access to safe water. Nature and

society thus interact in the dialectical and complicated ways. Both of them influence how people benefit not only from arsenic mitigation but also from the development interventions in general.

Participation can become either a nice label, or an actual tool to develop the communities. It has been reported that the GoB used participation as the means of consultation or persuasion, rather than as the means of agenda-setting or empowerment (Wood, 1999, p. 21). Participation is also a word that attracts donors. However, there are examples of the successful participatory approaches (Duyne, 2004; Hoque et al., 2000). Atkins, Hassan, and Dunn (2007, p. 164–165) even suggest that the deliberative democracy is the right way for Bangladesh to achieve successful and sustainable arsenic mitigation. Muller (2007, p. 5) concludes that community participation in arsenic mitigation is de facto required, regardless a political paradigm.

6.1 Community and screening

Screening of the wells is typically connected with labelling of each well according to its arsenic status (George et al., 2002, p. 2; WB, 2005b, p. 113), which relates closely to arsenic awareness. Evaluation of a large-scale community-level arsenic education program '18 District Towns Project' showed the hitches around marking the wells. The problems were due to not considering the complicated ways people perceive information or simply the local geographical conditions (Hanchett et al., 2002, p. 394).

First, the perceptions of the colour-marking system are not always the same and the universal acceptance or understanding may not work in future. Second, the use of special signs such as the question marks[13], are confusing, especially for the illiterate people. Third, not bearing in mind the weather conditions of Bangladesh and not ensuring the regular maintenance caused vanishing of the marks after the monsoon season. Thus, the clear identification of the tube wells was hampered (Hanchett et al., 2002, p. 397).

If we strived for the maximum level of participation, involvement of the local community members in screening would seem convenient. However, George et al. (2012, p. 1) observed there was no substantial difference between the ability of the community and outside testers to motivate the households to use the arsenic-free water sources. On the other hand, community involvement in screening may provide a sustainable and cheap option for the communities to monitor their exposure. In conclusion, arsenic screening alongside with awareness provided by the testers, irrespective of their residence, can be an effective, low cost tool to reduce arsenic exposure (George et al., 2012, p. 9; Hanchet et al., 2002, p. 400), encouraging the affected households even to switch to the alternative water supply options (Schoenfeld, 2005, p. 100).

[13] The question marks indicate the uncertain content of arsenic in tube well water.

6.2 Community and awareness

Aware and educated communities are crucial in mitigating arsenic contamination. So far, arsenic awareness has been provided entirely from the outside. Community involvement and participation in such activities is necessary but differs from project to project. Although the stakeholders agree that the use of community-specific communication methods is needed (WB, 2005b, p. 114), the actual implementation of these ideas often falls behind.

There have been the inquiries trying to determine which characteristics of community members and other factors influence the knowledge on arsenic. On one hand, Aziz, Boyle, and Rahman (2006, p. 334) found that people's education, age or gender had no effect on the knowledge of arsenic contamination in a household. On the other hand, education influenced the likelihood of avoiding arsenic exposure. Moreover, other investigations suggest that especially education and access to information play an important role in the level of arsenic awareness (Hadi, 2003, p. 99; Hanchet et al., 2002, p. 400). Finally, Hanchett et al. (2002, p. 396) and Hadi (2003, p. 97) agree in their investigations that the people influenced by an arsenic mitigation program knew more about arsenic issue than the non-program influenced.

The communication canals by which people learn about arsenic are important for designing of the future interventions. Research by Ahmed et al. (2005, chapter 5, p. 13) showed that the largest proportion of respondents (37%), who had been already using some kind of mitigation option, had learned by 'word-of-mouth.' Other significant communication ways included radio and TV (26%) and NGO activities (21%). Only 9% of people were informed through the tube well testing though, which interferes with the findings of Hanchet et al. (2002, p. 400) or UNICEF (2008, p. 3).[14]

Besides the educational status, the way the awareness programs are implemented strongly influences the actual avoiding of arsenic exposure. Aziz et al. (2006, p. 334–335) emphasised the key distinction between establishing awareness and taking action. Being well-educated does not necessarily mean people will shift to the safe mitigation options. Although the studied awareness campaigns were successful in terms of informing the public, they did not affect the behaviour or actions of the people (see Johnston et al., 2013). Children can act as the family or community change agents in reducing the exposure, but only if the adult-aimed awareness campaign is performed as well (Hanchet et al., 2002, p. 400).

[14] This may be caused by (1) the fact that most of the respondents in the study where women, who are limited in going out of home (Ahmed et al., 2005, chapter 5, p. 13), and (2) by insufficient implementation of screening provided without arsenic awareness.

6.3 Community and the alternative safe water supply options

Various mitigation options are available. Social and other processes within community play an essential role in the desirable outcome of people using and maintaining these options. The social factors determine what kind of the option is going to be most successfull (Hug, Leupin, & Berg, 2008, p. 6322; Mosler, Blochliger, & Inauen, 2010, p. 1316). In order to achieve successful implementation, the combination of close integration with the community at all stages and the appropriate technical solution in needed (Anstiss, Ahmed, Islam, Khan, & Arewgoda, 2001, p. 272).

Use and maintenance of the alternative safe water supply sources

Inadequate access to safe drinking water has been one of the main reasons for non-compliance with alternative safe water sources. Access to the arsenic-free water source is closely related to other factors influencing the compliance which are social conflicts and willingness to walk (Milton et al., 2012, p. 5). Willingness to pay is other significant factor, often monitored (WB, 2005b, p. 132; WSP, 2003). Quality and quantity of water at disposal from the particular alternative water supply option also affect whether the affected people comply with the option or not.

Water quality and quantity

Turbidity, bad smell and taste or insufficient water flow that comes from the alternative water sources influence preferences of the end-users (Milton et al., 2012, p. 5).

Social conflicts

Social conflicts have arisen especially in case of sharing of water sources. Well sharing is controversial because of the conflict between the need of 'the outsiders' and the irritation caused to existing users. Conflict was greatest where safe water was scarcest (Ravenscroft et al., 2009, p. 245).

Willingness to walk

The distance to the nearest safe well is important in determining whether or not people are willing to walk to access arsenic-free water. Ravenscroft et al. (2009, p. 246) found out that when the nearest safe well was within 50m, 68% of people switched sources. But when it was more than 150m away, the proportion dropped to 44%. Given a choice of sources within 50m, people preferred community wells.

In the study by Johnston et al. (2013, p. 478) almost all of the institutional stakeholders agreed that end-users should be willing to walk a certain distance for water, while only 10% believed that end-user should not walk at all for water. However, stakeholders realized that religious and cultural issues restrict people's willingness to walk for water.

Willingness to pay and affordability

To investigate willingness to pay, Water Sanitation Program (2003, p. 60) used surveyed both the affected and unaffected (control) areas. Most of the people expressed willingness to pay for one or more of the evaluated mitigation technologies.[15] Even though people are willing to pay, they might not be able to afford it. Ravenscroft et al., (2009, p. 245) describes case studies from Bangladesh where the economically well-off were better able to connect to the municipal distribution system. Poor people, in contrast, were more likely to continue using contaminated wells. Not only due to lack of financial resources, but also because low social status reduced their ability to share arsenic-free tube wells.

Other factors

Johnston et al. (2013, p. 479) analysed arsenic mitigation from institutional, technical, and psychological perspective. The authors found that self-efficacy and norms are the most important factors to explain the use of arsenic-safe tube wells.[16] Out of the norms, the descriptive norm, i.e. what is thought to be usual or popular in a given situation, and the injunctive norm, i.e. what one thinks that others think should be done (Cialdini, 2003, p. 105) played the main part. Other important factor was instrumental attitudes or perceiving water collection as time consuming and effortful. The studies by Inauen and Mosler (2013) and Inauen, Tobias, and Mosler (2013b) further revealed the importance of commitment to the use of safe water.

Community versus household based arsenic mitigation options

Investigations of arsenic mitigation projects showed that most of the end-users (WSP, 2003, p. 59) as well as institutional stakeholders (Khan & Yang, 2013, p. 501) prefer community based over individual household options. The reasons behind the preference in case of institutional stakeholders were reduced localized contamination of the aquifer, possibility of routine efficient monitoring, cost-effectiveness, provision of broader safe water coverage, a centralized service with connection to the households as endpoints and a better performed system where the community was mainly poor (Khan & Yang, 2013, p. 501).

Study by WSP (2003, p. 59) implicates that community based options were favoured by the end-users due to less responsibility bore by them than it would be in the household based options.

However, individual household based systems could be managed better than community based ones due to associated accountability and ownership issues. Accessibility and

[15] The selected technologies for the study were: three-kolshi (pitcher) method, household and community based activated alumina method, dug wells, pond sand filters, and deep tube wells (WSP, 2003, p. xi).
[16] See also Mosler et al. (2010), Inauen, Tobias, & Mosler (2013a), Inauen & Mosler (2013), or Inauen, Tobias, and Mosler (2013b).

inconvenience are the inherit difficulties associated with community based systems (Atkins et al., 2007, p. 162). Sharing might create socio-cultural chaos. In many cases inaccessibility to water sources occurred during monsoon and flooding season (Khan & Yang, 2013, p. 501). Since female have low social status in Bangladesh, yet are primarily responsible for water collection (Dey & Ali, 2010), community water options can create cultural and social inconveniences for them.

On the other hand, community wells may offer a promising solution for villages where a large proportion of the wells already in use contain water with a high concentration of arsenic. They can provide enough water for about 500 people, roughly the number of people residing within the distance of 150m that women are willing to walk several times a day in order to fetch water for their families (van Geen et al., 2003, p. 637).

Absence of community involvement and participation was found to be the key factor in unsustainability of the community based systems (Jakariya & Bhattacharya, 2007). Prior to installation of any community based water option, the community needs to be consulted and their participation in site selection and installation ensured. Otherwise, the community does not comply with and feel accountable for the options installed (Khan & Yang, 2013, p. 501). Community involvement is needed in water quality monitoring and alternative water sources maintenance (WB, 2005b, chap. 2; van Geen et al., 2003, p. 637).

6.4 Community and patient identification and treatment

Marginalized groups of poor, children, and women are the ones suffering most from arsenicosis and its effects. People with the lower annual income are more likely to develop arsenicosis[17], which may be associated with malnourishment (Nahar, Hossain, & Hossain, 2008, p. 46). Malnutrition increases likelihood of arsenicosis (UNICEF, 2008, p. 2). The poor are financially limited in treatment (Moinuddin, 2004, p. 12; Rammelt & Boes, 2005, p. 313). Moreover, being sick can reduce their ability to work and thus, without access to the proper health care and social services, encircling them in poverty (Ravenscroft et al., 2009, p. 191). Children are more prone to the health effects of arsenicosis. Prenatal arsenic exposure apparently increases the morbidity and mortality later in life (FAO et al., 2010, p. 8). Even though women are less likely to develop arsenicosis, the social consequences are worse for them than for the other community members. Even the mild symptoms can cause serious social stigmatization.[18]

[17] Study by Sarkar and Mehrotra (2005) in West Bengal, which is culturally very close to Bangladesh, confirmed that the prevalence of severe symptoms and the mortality rate were significantly higher among individuals of the lower socio-economic status.

[18] Sarkar and Mehrotra (2005) also revealed that the women are less likely to seek treatment.

7. Evaluation Design and Methodology

The study presented in this thesis is a qualitative evaluation. The study results from my internship at a NGO called Thanapara Swallows Development Society (TSDS), Bangladesh.[19] The previous, theoretical chapters gave us the important information on the context of what follows––the evaluation of arsenic mitigation work implemented by TSDS from the perspective of recipients and translation of the findings into the recommendations in terms of community development.

7.1 Evaluation objectives [20]

General objective
This qualitative evaluation study aims to influence the decision-making of TSDS through the provision of empirically-driven feedback on its arsenic mitigation work.

Specific objectives

1. To assess the activities of TSDS in arsenic mitigation from the perspectives of recipients.
2. To translate the evaluation findings into the recommendations for TSDS in the terms of community development.

7.2 Evaluation questions

1. What are the recipients' perceptions and experiences of TSDS's arsenic mitigation work in the community of Miapur, Bangladesh?
2. How can the work of TSDS in Miapur be transformed into community development?

7.3 Motivation and justification

The evaluand[21] was chosen for several reasons. I specialize in water and sanitation sector and arsenic mitigation activities were one of the few things TSDS implemented in the sector. Given the gravity and complexity of arsenic contamination in Bangladesh, I considered the issue to be important and interesting to examine. To my knowledge there had not been any evaluation of TSDS's projects focused on the recipients' perspective or community development. The results of evaluation should contribute to the working knowledge of TSDS and to improvement of its work in the field. At the personal level, the implementation of evaluation has developed my various skills and let me grew more as a person.

[19] The internship was conducted in north western Bangladesh from June to August 2013 with my two other classmates. They were of invaluable help during the internship and actual implementation of the study, providing critical feedback and support.
[20] The process of inquiry required changes of the objectives and questions. I found out on the spot that the research I was planning to conduct had been already done by other organization. I had to therefore change the field of interest. Eventually, the design and methodology study had to be adjusted to qualitative evaluation in accordance with the available data.
[21] The object of evaluation.

7.4. Methodology

An evaluation is the systematic acquisition and assessment of information to provide useful feedback about some object. The term 'object' can refer to a program, policy, need, or an activity (Trochim, 2006). An evaluation can be either qualitative or quantitative, or both. In a qualitative evaluation, the uniqueness of human experiences is emphasized. A qualitative program evaluation builds from these experiences upwards, seeking the patterns but staying open towards the new or unexpected (McDavid et al., 2013, p. 175).

Qualitative methods are often used in the evaluations because they tell a program's story by capturing and communicating the stories of participants and of an overall program. Understanding the stories is useful because it illuminates the processes and outcomes of the program for those who make decisions about the program (Patton, 2003, p. 2). The principal measuring instrument in qualitative evaluations is the evaluators themselves. It is not possible for an evaluator to claim objectivity. Observations, interactions, and renderings of the narratives and other sources of information by an evaluator are a vital part of assembling the patterns, and making an evaluation report (McDavid et al., 2013, p. 176).

7.4.1. Theoretical Framework

Program evaluators can construct the conceptual frameworks, which then guide the evaluation, including data collection and analysis (McDavid et al., 2013, p. 179). I used the categories of the SLF to frame my perspective in data collection and analysis. I translated the evaluation findings into the recommendations in terms of the concept of community development. The SLF can become an understandable and clear tool to understand the rural livelihoods. The SLF represents a widely-used approach that has not been much connected to the concept of community development yet as it could have been. The transformative features and principles of community development can enhance the approach as well as the SLF can compensate the weaknesses of community development (see section 5.5).

7.4.2 Operationalization of the problem

Delimitation of theoretical concepts

I used the categories of SLF as a tool to frame data collection and analysis. The categories applied are five Capitals (natural, physical, human, social, financial); Structure, Policies, and Processes; and the Vulnerability context. I build the recommendations of the study upon the concept of community development and its principles. Community development features the integrated approach, collective actions, needs orientation, objective orientation; happens at the grassroots level; is assets-based and is democratic. If successful, it leads to awareness, further development, demonstration effect, learning, and community building. Ethical principles behind community development are human orientation, participation,

empowerment, ownership, sustainability, and release. These ethical principles are practically achieved by learning, compassion, adaptability, and simplicity.

Delimitation of analytical units

Universe
In relation to the evaluation objectives and questions, the hypothetical universe to which the study can be projected is formed by the recipients of TSDS's arsenic mitigation work.

Population
The set of units that I studied is the arsenic-affected community of Miapur. This particular community was chosen out of the two locations where TSDS arsenic mitigation work takes place.[22] It was selected because of its close proximity to Thanapara village where I resided during my stay in Bangladesh and the richness of information it could offer.

Sample
In order to get the part of population I wanted to study, the non-probability sampling was used, more specifically purposive sampling and snowball sampling. Purposive sampling chooses the study participants based on the purpose of their involvement in the study (Guest, Namey, & Mitchell, 2012, p. 48). In order to get as much as variability––to establish the range of attributes associated with the phenomena of interest, i.e. the perceptions of the recipients of arsenic mitigation work of TSDS––all the different parts of the population had to be represented in the sample. When studying the structure of the TSDS arsenic mitigation project, I identified three such parts or groups of the studied population: arsenic patients, the users of alternative mitigation options, and the participants of awareness campaigns. The members of these groups blend together. They cannot be understood separately, but rather as the sometimes overlapping pieces forming a mosaic of perceptions, notions,mand experiences. I also chose to conduct the interviews with providers of aid: Expert 1, a project manager, and Expert 2 from the top-management of the organization.

I accessed the population through Expert 1 who knew the people of Miapur personally. A local doctor assisted and acted as a translator and adviser.[23] That is when the snowball sampling technique was used. The technique represents a networking method when the initial number of participants nominates other participants who are then approached (Boeije, 2010, p. 40). Expert 1 facilitated contact with other participants of the project, these participants facilitated contact with other participants and so on. Also the people living in

[22] The other location is in Bagha upazilla, Rajshahi District, Bangladesh.
[23] The language barrier at first was impossible to overcome without a local translator and facilitator. Moreover, the cultural barrier between me as a foreigner-investigator and the locals was too broad to access the population without the facilitation of TSDS.

Miapur who were just passing by where the group interviews and participatory session took place joined the data-collecting activities.[24]

Space
The Miapur Village is located in Charghat upazila, Rajshahi District in north western Bangladesh, very close to the border with India which is marked by the Padma (Ganges) River (see chapter 8). All group interviews and participatory mapping session took place in one location in the natural habitat of respondents. It was the location where the villagers were used to gather for the purposes of arsenic mitigation project. The location was situated approximately in the centre of the village. It was formed by a quite large free space under the trees and the wooden shack with benches and surrounded by the houses of locals. Observation also took place in this location. The expert interviews were conducted in the headquarters of TSDS in Thanapara.

Time
The data collection took place during the period of June–August 2013. The two expert interviews took place in July 2013 as well as the participatory mapping session and the subsequent group interview did. Other two group interviews happened approximately one month later, in August 2013. The analysis of data, establishing the interpretations and writing the final report in the form of this thesis lasted since then until October 2014.

7.4.3 Methodology of data collection
The most common sources of qualitative data collection are the review of documents, observations, interviews (Creswell, 2009), and visual data (Boeije, 2012, p. 71). I used the methods of: review of secondary sources and personal documents, observation, participatory mapping, and semi-structured group and expert interviews. Valuable information was provided by the personal, informal communication with the staff of TSDS and the inhabitants of Miapur.

Review of secondary sources
Secondary sources or the sources of secondary observation are the data produced by the others and not the investigator. They may include the statistics, reports, project documentation, personal documents etc. (Disman, 2002; p. 309; Rato Barrio, 2013, p. 12). I reviewed the project documentation of current arsenic mitigation project that is running under the name 'Safe Water and Arsenic Treatment' and is funded by Emmaus International. Unfortunately, the documentation of the previous projects, funded by SDC and NGO Forum, were not available.[25] Data on these past projects were gained mostly from the online sources

[24] This is very specific for Bangladesh where the public life is very strong and anything unusual or interesting happening in public, moreover with the presence of a foreigner, gets a lot of attention.
[25] I repeatedly asked the staff of TSDS for the documentation of the past projects in arsenic mitigation implemented by the organization but was never able to get it for the reasons I have not been able to identify.

such as the websites of donor agencies and from the studies by Nahar et al. (2008) and Hanchett (2006). Nahar et al. also provide some data about Miapur village which I was not able to gain elsewhere.

Observation

I followed the method of 'observer as a participant' (Disman, 2002, p. 306) when the observer is in social interaction with the community members but does not pretend an actual participation or belonging to the community. At the time I was in Bangladesh, the arsenic mitigation project was after its active phase, thus I mostly observed the activities connected to health care of arsenic patients. Observation allowed me to see the recipients in their natural habitat and daily social life and to examine the relationship between them and the providers of aid, i.e. TSDS.[26]

I was able to be a part of one of the 'arsenic medicine distribution camps' as an observer, which was also my first encounter with the recipients. I also observed how the project manager and TSDS staff work and thus influence the result of project activities. I repeatedly visited Miapur, trying to examine the arsenic contaminated wells and the available alternative mitigation options located there, the social life of locals and to engage with them in the social interactions.

Participatory mapping

Participatory mapping is the creation of maps by the local communities, in its broadest sense (International Fund for Agricultural Development [IFAD], 2009, p. 4). There are plenty of participatory mapping tools. Being the least demanding on time, finances and capacities, the hands-on mapping was selected for purpose of this qualitative evaluation study.

Hands-on mapping involves the basic mapping methods in which the community members draw maps from memory either on the ground, or on the paper. Both tools have its highs and lows (see Annex 3.). I chose to involve the sketch/paper mapping. Sketch/paper maps represent the community-identified land features from a bird's point of view. They do not rely on the exact measurements, a consistent scale or geo-referencing. They do show the relative sizes and positions (IFAD, 2009, p. 13).

The participatory session's helped to establish trust between me as an evaluator and the residents of the village and to get a broader picture of the locals' indigenous knowledge of their living area, particularly in terms of arsenic contaminated and safe water resources. There were 22 participants from 15 to 60 years of age. The participants involved all the sample groups I identified: patients, users of alternative mitigation options, and the target

[26] I was aware of the influence I had as an observer on the behaviour of community members. I tried to limit it by being as 'normal' as possible. I was getting to Miapur by the means of common transport and tried to avoid an extra attention. Common transport in Bangladesh involves a variety of vehicles. We used a *ban*, a bicycle with a desk behind that is rode by a man.

groups of arsenic awareness. Mapping was facilitated by one of the TSDS staff, a human rights project manager.[27] There were arsenic mitigation project manager as organizational support, and the local doctor presented as a translator. The accrued map was documented (see Annex 4) and, after the discussion with the respondents, given to TSDS to store, where it can be accessed by any community member. After the session, a group interview followed (see Interviews section). The whole activity lasted one hour.

Interviews

Interviews are important in a qualitative inquiry because they assume that the "individuals have unique and important knowledge about the social world that is ascertainable and can be shared through verbal communication" (Hesse-Biber & Leavy, 2010, p. 94). I used the form of semi-structured interviews. Semi-structured interviews rely on a certain set of questions and try to guide the conversation to remain on those questions. However, they also allow the respondents space to talk of what is of interest or importance of them (Hesse-Biber & Leavy, 2010, p. 102).

Group interviews

I conducted three group semi-structured interviews with the recipients of arsenic mitigation work in Miapur. As an investigator, I followed the suggestions of Rato Barrio (2013) for methodology of an interview. In the interview structure, I used the categories of the SLF: five Capitals, Vulnerability Context and Structure, Policies, and Processes. I asked mostly open-ended questions but used close-ended ones too. I also left the space for the respondents' inputs.

The interviews were conducted in Bangla, with running translation to English. They were recorded, with the verbal informed consent of interviewees. The first interviewees were six young people from 15 to 25 years of age. The other group interview followed, with 10 respondents from 30 to 60 years of age. All the group interviews lasted at least 30 minutes. Both interviews included the representatives of different arsenic-affected groups.

Individual Expert Interviews

I conducted the interviews with two experts from TSDS staff. Both interviews were less structured than the group interviews and used open-ended questions. Each lasted about 45 minutes and was done in English. Each of them was recorded with the verbal informed consent. The purpose of these interviews was to analyse the context and situation of arsenic mitigation work in Miapur and the project itself from the perspective of the implementing organization.

[27] A manager of TSDS's human rights program, having vast experience in community work and group facilitation, offered his help during the mapping session.

7.4.4 Methodology of data analyses

To analyse the 'raw' data, I used a qualitative content analysis. Analysis of qualitative data consists of segmenting the data and reassembling them to transform them into findings (Boeije, 2010, p. 94). Data are organized or categorized into the concepts by the process of coding.

I categorized the raw data within the categories of SLF as they were used during data collection: Capitals; Structures, Policies, and Processes; and Vulnerability context. I compare the view of the recipients with the view of the providers of aid. I then translated the findings into and related them to the concept of community development, to provide recommendations for further implementation of arsenic mitigation (see chapter 9, 10).

7.5 Quality Evaluation Criteria

To ensure the quality and trustworthiness of evaluation study, I followed the different strategies suggested by Guba (1981) and Patton (2003). I used the triangulation of methods and sources. I collected as much the detailed information as I could in order to permit the comparison of the research context to other possible contexts. Also, the referential adequacy materials were collected and tested against the findings. The sampling was not intended to be representative or typical but to provide the maximum of information available. Different data collection methods were used to compensate each other, and to strengthen stability. I consulted other researchers and experts during the inquiry. I tried to reflect on each potential underlying epistemological assumption I could have. To do that, I kept a continuing journal and established peer debriefings.

7.6 Ethical criteria and considerations

Transparency and consent

All participants of the interviews and of the mapping session were informed about the objectives of the research and asked to give their consent to the recording and use of their answers. Each photo picturing the respondents during the inquiry was taken with their consent as well. When presenting the findings, I tried to stay as anonymous as possible regarding the respondents' identity.

Respect for the respondents and their rights

During the whole inquiry, I respected all respondents, their knowledge, dignity, and their rights. Each of them was entitled to leave the interviews or not to give an answer if they did not want to. I respected the respondents' right not to participate. To protect their right to information, I gave as much information about the study as possible and ensured there was a space to ask me any questions.

Exploitation and negotiation

The biggest ethical concern I experienced during the research was of exploitation and negotiation. I persistently asked myself how much I am, as an investigator, allowed to intrude into the lives of local people. The whole situation was even more complicated than usual due to Ramadan and the weather conditions. The borderline between an inquiry and exploitation was sometimes very thin and hard to find.

The process of negotiating the recruitment of respondents is related to the issues of exploitation. My influence on the recruitment was, despite my efforts to change it, limited. Expert 1 facilitated the recruitment but was pre-occupied with other tasks and our communication was problematic. The dilemma I was dealing with was the same––how much can I ask of the local worker as an investigator.

Bias and assumptions

I considered dealing with bias and assumptions one of the main topics related to the ethics of research. Bias and assumptions arising from the language, cultural or psychological barriers were one of the main limitations I experienced. They were the cause of a number of misunderstandings which subsequently led to the delays and complications in the course of inquiry.

One of the most significant assumptions or bias I met as an investigator was the one when a part of the respondents thought I was paying TSDS to conduct the research and the money is kept from the respondents by the organization. I dealt with bias and assumption by providing as much as information as I could and by practising reflexivity.

Other

The sample of the studied population was equally represented by both women and men. I did not make any difference between the genders, yet was trying to maintain the balance to obtain both perspectives. The research was minimally harmless to the environment. The transport used was gasoline-free, all activities happened in the natural habitat of respondents and during our stay we used the local resources and managed them as sparingly as possible.

8. Situation Analysis

8.1 Stakeholder Analysis

8.1.2 TSDS

TSDS was originally founded by The Swallows, Sweden in Thanapara village in Bangladesh in 1973. The organization gain full independence in 1999. TSDS has been implementing a number of various projects and programs focused on disadvantaged and marginalized people. Its work includes the topics as diverse as fair trade handicraft, agriculture, education, and human rights activities. One of TSDS's initiatives is also arsenic mitigation. The recipients of arsenic mitigation work implemented by TSDS are entirely rural population, especially the rural poor.

TSDS has 85 staff and employs over 170 people in the fair trade Handicraft program. The staff often exercises multiple responsibilities within the organization.[28] The organizational and personal structure of TSDS is a tightly interlinked web, not only within itself but also within the relationships and structures in the local area, including the village of Thanapara, the town of Charghat and the local government bodies.

The organization is partly financially independent due the Handicraft program. However, it could not function without its donors. The organization's activities have been supported by the different NGOs and agencies mostly from the countries of global North. The most important present donors are Swedish and Danish Swallows and Emmaus International which funds the current arsenic mitigation project.

8.1.2 Recipients

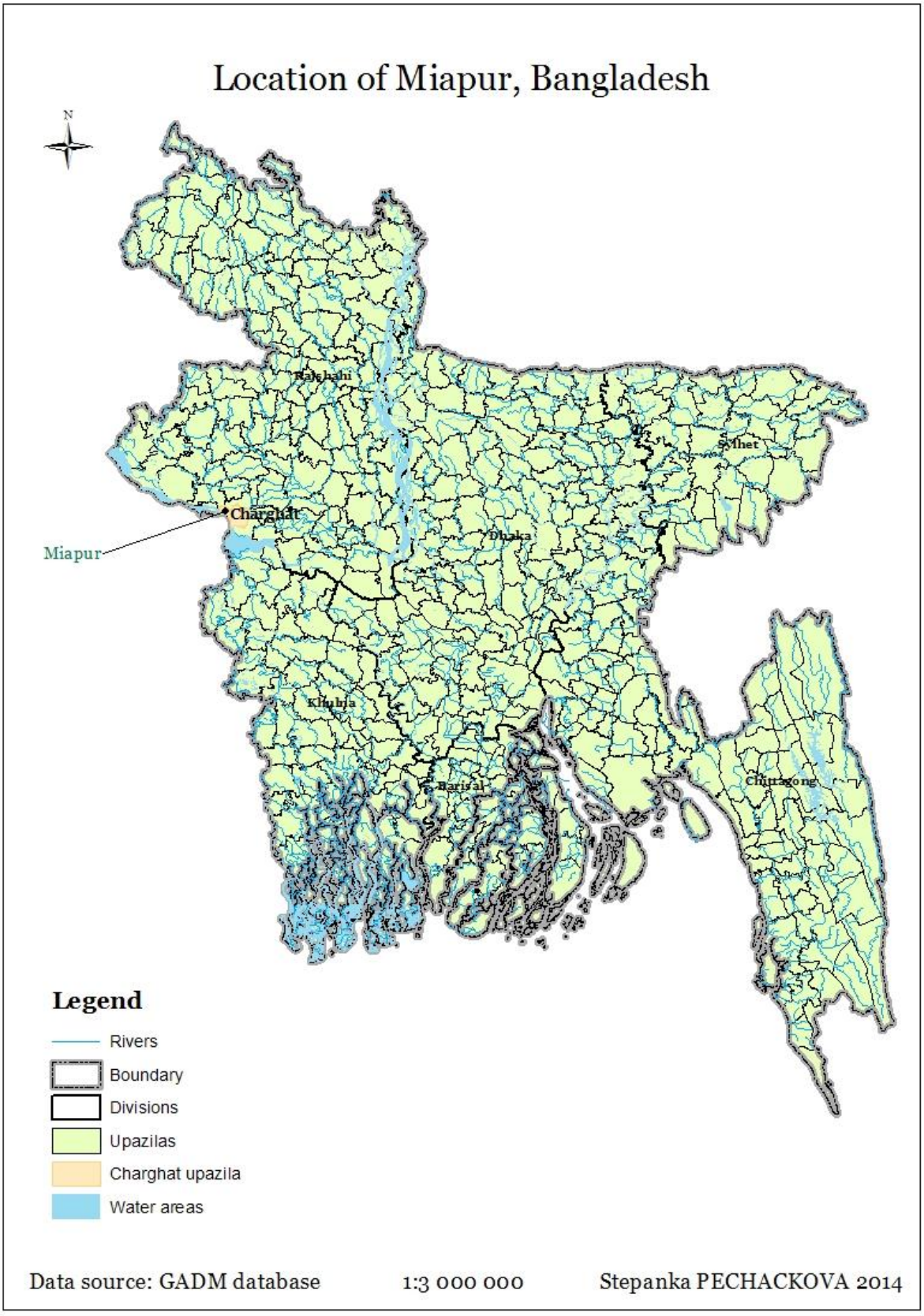
The Miapur village is located in Charghat upazila, Rajshahi District in north western Bangladesh, very close to the border with India which is marked by the Padma (Ganges) River. It is the village of 2.08 km^2 and around 2,000 inhabitants.[29] Almost all the villagers are Muslim, expect for a small Hindu minority. Most of people from Miapur work in agriculture.

Arsenic was first discovered in the water sources of Miapur in 1998. Since then, various arsenic mitigation initiatives took place in the village under the different donors. However, they were all implemented by TSDS. TSDS acted all the time as a provider of assistance whereas the inhabitants of Miapur as the recipients of this assistance.

[28] As I show in chapter 7, this had considerable consequences on the study.

[29] In 2005, according to Nahar et al. (2008, p. 43) Miapur had 1,733 inhabitants. Given the annual population growth of 1.5% in Bangladesh, the population should have been around 2,000 in 2013.

Figure 8. Location of Miapur



8.1.3 Donors

The Development Association for Self-reliance, Communication and Health (DASCOH) or SDC, and NGO Forum phased out from Miapur for the different reasons. One of the reasons was simply a time frame of the projects. Another reason was the 'low' rate of arsenic contamination of local tube wells which decreased below 30% (Expert Interviews [EI] 1, 2). The donor agencies saw necessary to move their activities to a more affected area which is about 40km off Miapur and where TSDS works as well. Emmaus International offered support to TSDS in the water and sanitation sector in 2010. It was decided to direct this support to the arsenic mitigation issue. Emmaus is characterized by an unusual level of decentralization and by allowing the supported organizations quite a wide 'space' to do what they want. The cooperation between Emmaus International and TSDS runs smoothly, without unnecessary bureaucracy and administration (EI 1, Observation [Obs]).

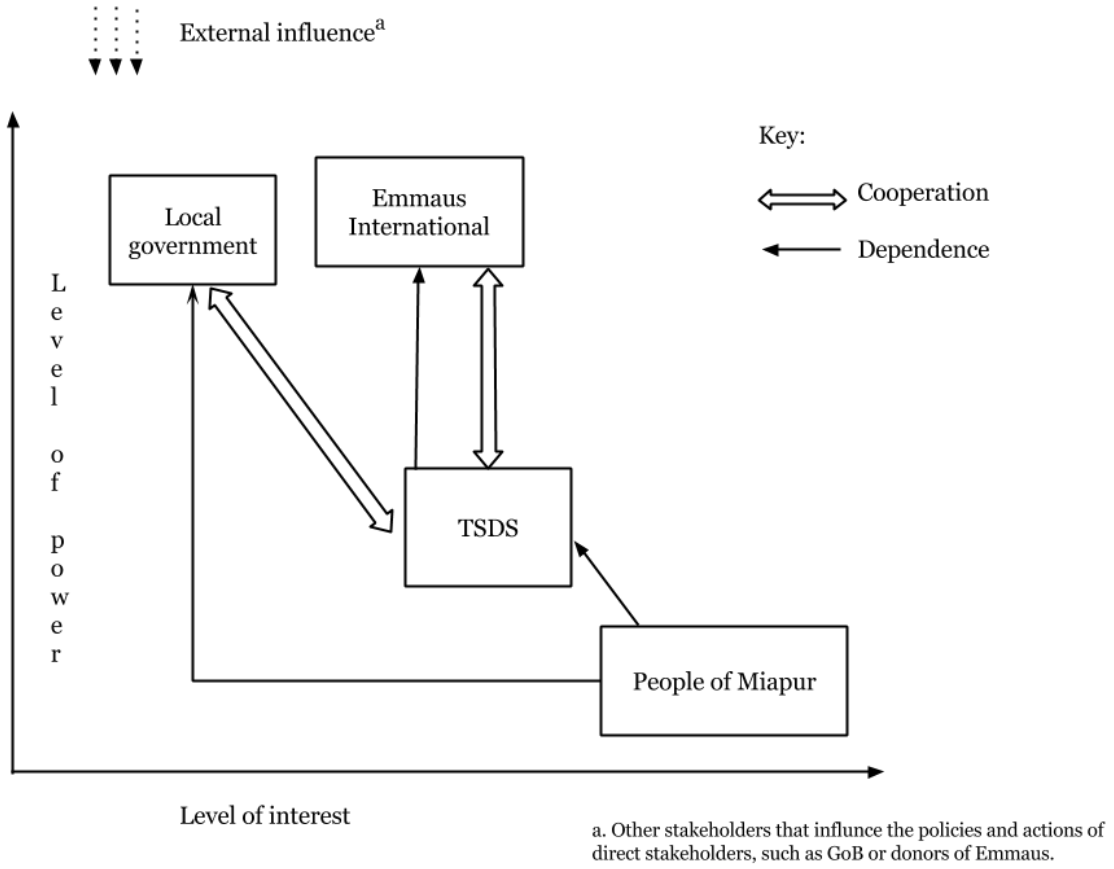
8.1.4 Local government bodies

Chapter 1 shows the structure of public governance in Bangladesh. Rural local government has three tiers which are in case of Miapur: Rajshahi zila (district), Charghat upazilas (sub-district), Charghat union parishad. The Union Parishads were identified as crucial for implementing arsenic mitigation. However, their role is limited due to the high centralization of power and corruption (see chapter 6). Yet the relationships between TSDS and the local government bodies are fine. On one hand, the local government does not interfere into the activities of TSDS. On the other hand, the local government does not seem to take much interest in being involved much in arsenic mitigation in Miapur (EI 2, Group Interview [GI] 1).

8.1.5 Mapping of stakeholders

To show the identified relationships among stakeholders, I created a stakeholder map (see Figure 5.). The map is based on the Power versus Interest grid stakeholder analysis as described in Bryson (2004, p. 30). In this case, the two grids show on the left side a level of power a stakeholder holds; on the right side a level of interest a stakeholder has in the issue of arsenic mitigation in Miapur. Two types of relationships were identified: cooperation and dependence. The pictured stakeholders have more or less direct influence on the issue but there are other, external stakeholders that indirectly influence the situation such as the GoB or donors of Emmaus.

Figure 9. The stakeholder map



8.2 Activities Summary

After arsenic was discovered in Miapur, the initiatives to mitigate arsenic contamination and in general to improve water and sanitation started in the village. First, DASCOH coordinated the activities under funding of the SDC. The SDC phased out and arsenic mitigation work was then supported by NGO Forum for Drinking Water. Eventually, Emmaus International replaced NGO Forum in funding of the activities in Miapur in 2010.

TSDS has been as an implementing organization of these initiatives. The organization has been working directly with the people in the affected areas including Miapur. Its activities did not involve just ensuring safe water supply, but also personal hygiene awareness and establishing proper sanitation (Review of secondary sources [RSS], GI 2).

TSDS wanted to follow its long term involvement in sensitizing the community and addressing arsenic contamination. The organizations established 'Safe Water and Arsenic Treatment Project' under Emmaus International funding. The project is the first one where TSDS runs the project and is almost fully autonomous.

The project's objectives are:

a) To aware and motivate villagers along with the youth about the importance of water and the ways to preserve it.
b) To create sustainable sources of water in the rural and municipality's areas, along with saving and recharging the traditional water sources.

The arsenic mitigation activities have consisted of so called the hardware and software support. The hardware support involves identifying people who are affected by arsenic and providing proper treatment for the arsenic affected patients. Arsenic contaminated water sources have been clearly demarked and arsenic-free water sources established. The arsenic-safe water options include deep set pump, dug well, and rain water harvesting plant. Water has been regularly tested on arsenic occurrence.

The software assistance has included training affected communities in management of the newly established water sources. It has encouraged formation of the village level committees to ensure such management and to disseminate further obtained knowledge on water significance and conservation. Awareness campaigns on water management have been organized at all levels - for community leaders as well as for arsenic affected patients and youth through activities such as courtyard meetings or training programs.

In the time of evaluation study, in 2013, the active phase of arsenic mitigation work in Miapur was over. The existing activities involved arsenic patients' treatment and maintenance of established alternative safe water resources. The focus of TSDS' arsenic mitigation work moved to another village where arsenic contamination was more pressing issue than in it is in Miapur (EI 1).

9. Findings

9.1 The recipients' perspective

9.1.1 Natural and physical capital

Natural and Physical capitals are more interrelated than usually in the case of arsenic contamination of water. That is why these two categories are presented here together. Arsenic occurs naturally in groundwater that is widely used as potable water in Bangladesh. In order to deal with arsenic contamination, the adequate infrastructure of and access to safe water resources is needed. Access to quality and safe water supply subsequently influence all other capitals, especially Human capital (health).

In terms of Natural and Physical capital, TSDS, in accordance with the common practice, focused on screening with marking of the contaminated tube wells and providing the arsenic-safe water sources. Besides arsenic mitigation, TSDS worked on provision of the safe water and sanitation infrastructure which was appreciated by the respondents (see section 9.1.2).

The situation regarding arsenic contamination in Miapur improved over the time. It was seen much better in the than it had been in the past. The respondents of all group interviews emphasized the difference between before and after TSDS began to work in the village.

"It was worse, bad before…It was large scale of arsenic contaminated. And now it's getting better and better."

"It was problem before but there is no problem now."

"It is not present problem, it was before. That's why they drank arsenic contaminated water and they were affected by arsenic"[30] (GI 1).

The availability of and access to arsenic-safe water sources in the village were considered satisfactory. The respondents attributed the availability of safe water to the work of TSDS. They were talking about the tube wells, rain water harvesting plants, and dug wells in relation to the questions on alternative water sources provided by TSDS. No obstacles or social conflicts limiting the access were noted.

"They are saying how many safe water resources there has. Every house has a tube well and it's not a problem."[31]

"So no problem about water because there is a lot of available water source like rain water harvesting and dug well, so no problem about water."

[30] The transcribed statements from the group interviews are stated as they were translated from Bangla to English by an interpreter, including the mistakes in English grammar. The third person "they" indicates the respondents.
[31] This includes also water resources not provided by TSDS.

"Now, this day it's really good. Because the NGO take some step, like Swallows, they built up some deep well, some well, rain water harvesting…and that's why the situation is good…" (GI 2).

"They're saying about they're drinking safe water, water provided by Swallows" (GI 1).

The quality of alternative mitigation options provided by TSDS such as tube well or rain water harvesting was seen as good.

"We are satisfied [with the safe water resources]" (GI 1).

"He's saying RWHP is good, really good" (GI 3).

The maintenance of the water sources was performed by the respondents themselves.

"They didn't took any training but when [Expert 1's name] provided them this type of facilities, he explained how to take care and that's how they know" (GI 3).

However, when need for repairs or other problems occur, the respondents trusted the representatives of TSDS to do something about it. If an alternative water resource needed repair, the respondents "come to get [Expert 1's name]" (GI 3).

"Sometimes they face some problems, like something destroy or something does not work properly. Then they ask to Swallows and Swallows help."

"And we get support by some technical like engineer, like take care this and who can repair it" (GI 2).

The quality of water provided by the mitigation options varies minimally according to the respondents:

"It [water] is enough and good[32]" (GI 1).

"He says it's like medium quality, not good, not bad. It can drink, but it's medium."[33]

The respondents wished that TSDS continued providing the new safe water resources. They suggested expanding of the current activities because there were some new arsenic contaminated water sources found. Other alternative water sources needed to be built.

"He's saying there is few tube well newly where they found arsenic so Swallows should include the people in this program" (GI 2).

"He also suggest there is some new arsenic contaminated tube well so it should mark and it should…Swallows provide extra water source for this" (GI 3).

[32] If necessary, I add the object of statement in the brackets to clarify replies of respondents.
[33] The quality of water discussed was from a rain water harvesting plant.

9.1.2 Human capital

Efforts to improve the recipients' Human capital are generally represented in arsenic mitigation by patient identification and treatment, and awareness activities. This was also the case of arsenic mitigation implemented by TSDS. The organization has worked in both health care of arsenic patients and arsenic awareness.

Arsenic patients were identified and were being provided the regular treatment which improved their health condition. Arsenic awareness began with the screening of arsenic contamination of groundwater (see chapter 3). Then the workshops at schools, courtyard meetings and Village Development Committee (VDC) raised the knowledge of and spread the information on arsenic. The caretaker trainings and briefings provided the recipients with some degree of skills to maintain the alternative water sources. However, the acquired skills did not lead to the people's complete independence because the reparations and other problems still required TSDS's intervention (see section 9.1.1). Awareness activities had potential not only influence Human capital (health, knowledge, skills, access to information) but also Social capital (see section 9.1.3).

Awareness of arsenic contamination in the village was widespread. The respondents were aware of the arsenic mitigation activities that were implemented by TSDS in their village. The meaning of the marking of contaminated tube wells, which is widely used in Bangladesh and was used in Miapur as well, was nothing new to them. They were also able to recognize and locate the arsenic contaminated and arsenic-free water resources.

The participatory map drawn by the respondents supports the evidence of high awareness among the recipients, beyond the awareness of arsenic contamination and mitigation (see Annex 4.).[34] The contaminated tube wells are pictured in the red colour in the map as the common marking in Bangladesh is. The contaminated pond is not in red but its status is labelled in the map. The relative size of the sources and position suggest high level of importance to the people.

People showed awareness of arsenic contamination and mitigation not only in the participatory map but also during interviews:

"Who affected first, he already died. He is a second man. And at first the doctor didn't recognize his disease. He just think it was just skin disease and then he went to Rajshahi[35] to test it and they found it was arsenicosis. That's mean affected by arsenic. And then they

[34] Making of the map and the result itself showed various kinds of awareness and skills. The respondents understood the task quickly. The people showed team work skills. The group cooperated smoothly; naturally deciding about the division of roles within a group, according to the competences of the members. The locals also showed skills of abstract thinking and of visual-spatial intelligence. They were able to use map symbols and use them coherently and accurately. Also, the legend and geographical coordinates of the map are accurate.

[35] Rajshahi is the nearest big city, the capital of the district and division where Miapur belongs and one of the biggest cities in the country. It is approximately one hour from Miapur.

realize there has arsenics and then that's why Thanapara Swallows…[a translator asks for completion]…At first Thanapara Swallows start this type of examination by water and they found arsenic in different tube well" (GI 1).

"So Thanapara Swallows made a team and this team worked this village and they mark the tube well red and green…"

"It was marked red or green signal tube well and that's why it's safe water" (GI 1).

"This day it's really good. Because the NGO take some step, like Swallows…they also test water and they mark tube well" (GI 2).

The respondents showed the knowledge of arsenicosis, of how it occurs and it is treated. Arsenicosis was clearly seen as a disease that comes from contaminated water and requires treatment. It was mostly associated with the symptoms occurring on the skin. The respondents stated that the medical treatment of arsenic patients improved compared to the past. But they missed the previous regular controls of patients conducted by a doctor.

"It was worse before, three years ago. But now is better." "Because now we are drinking safe water and take medicine, that's why" (GI 1).

"Now is better…Before it [water] was poisonous and that's why many people had skin disease and someone also died. But not now" (GI 3).

"Before there was one system like they took a doctor here and he checked this patient here so it was good and he suggest it should start again. Patient develop better, slowly but they need a check-up every six or three months" (GI 2).

Arsenicosis negatively influenced the recipients' ability to work. However, this condition was eased by treatment provided by TSDS. I discuss the relation between income and arsenicosis and the costs of treatment that were often mentioned in the interviews in section 9.1.4.

"They has problem because they feel pain in hand that's why they don't took work properly and they can't work in days or they can't walk in two days…"

"Someone changed their profession. Because they can't go Sundays or rain."

"If they take medicine and they going better and better…" (GI 1).

The communication channel from which most of the respondents learned about arsenic was the local organizations and institutions. The respondents mentioned particularly TSDS (GI 1, 2, 3), then Rajshahi University, and other NGOs (GI 2). The respondents attended the meetings of established committees, were a part of the workshops at schools or learned about arsenic during the screening. Another communication channel that cannot be overlooked and

that most probably plays an important role in ways how information related to arsenic contamination spread is a "word of mouth."

"We live in the village and we know everything about all families, and that's how we know about it [about the people that cannot afford the arsenic treatment]" (GI 3).

After TSDS started their awareness activities, "a lot of development" (GI 2) could be seen. The quality of awareness activities seemed not to concern the recipients much. Their answers were mostly short, not exhaustive: "I attained few meetings with this program. It was nice" (GI 3).[36]

Interviewing the recipients brought about two interesting notions. First, the recipients' view corroborated the findings that the children can act as family or community change agents in spreading awareness and thus reducing the exposure to arsenic (see Hanchet et al., 2002, p. 400). Second, Human and Social capital can increase if arsenic mitigation activities, including awareness, are linked not only to arsenic contamination of water but also to water quality and sanitation.

"It's really good if someone discuss in the school because if they tell to their mother…children doesn't follow their mother but they obey teacher and they are little bit afraid teacher so if they discuss in the school and teacher also tell them about this, then they realize yes, we should use."

"Before people didn't use sanitary latrine. They use sometimes open place but not now."

"Except Swallows who help them, he mentions few NGOs but it started from Swallows. It was before. In Bangladesh many people suffer why from diarrhoea and cholera and that is why the government take some steps to remove, or to protect this and that's why Swallows also think we should do something about this and people can be safe, that's why Swallows…few meeting and they concerning people about this" (GI2).

The recipients would welcome the resumption of the awareness activities. "They suggest like we should arrange some meeting and awareness about arsenic…"(GI 3). They did not feel that there was a lack of knowledge but they felt the need of remembering. "Like they are saying they know but if we arrange meeting again it will remind them" (GI 3). An example of good practice in awareness was stated: "There was one committee. It's called World Committee and there was many member, more than 150. Because it was first stage and there was many many arsenic affected patients" (GI 3).

[36] Another explanation can be that the respondents did not understand the questions regarding the quality of the awareness activities they attended or the questions were not translated adequately.

9.1.3 Social capital

Social capital is developed through the networks and connectedness; the membership of more formalized groups with rules and norms; and the relationships of trust, reciprocity, and exchanges (DFID, 1999, section 2.3.2). Arsenic mitigation activities in this category are represented particularly by the VDC. The committees were autonomous and were to address arsenic contamination in the village. Regular meetings served as a space for discussion, exchange of information, and solving problems. The committees, however, had ended their activities and the recipients did not continue such activity by themselves.

"So it was before one committee, but it's not now. Now take care by Thanapara Swallows."

"When it's built up first, then there was one committee to take care this but this committee is not still now" (GI 1).

"By this committee, Village Development Committee, sometimes they arrange meeting and they talk about this, you shouldn't drink arsenic contaminated water. It was like arsenic program. They talked about water purification, how to water purify like this and that's what was good about it" (GI 3).

The vertical, i.e. patron/client, rather than the horizontal networks were observed. There is a strong relationship between Expert 1––who is the representative of TSDS, a specific person who provides aid––and the recipients. Expert 1 knew the recipients personally and communicated with them on a daily basis (Obs). The recipients relied on the providers of aid. The representatives of TSDS, respectively other local NGOs are the first instance where the recipients turn for help.

"They didn't went anywhere. Someone came to help them. It's one of Swallows and others" (GI 1).

"We come to get [Expert 1's name]" (GI 3).

"Sometimes they face some problems…Then they ask to Swallows and Swallows help" (GI 1).

The topic of self-dependence or independence emerged in relation to the existence of VDC during the group interviews. The recipients felt the committee enabled them to be self-dependent. They exclaimed the need to be independent while being aware of the partial dependence on the providers of aid––when "…they face some problems… they ask to Swallows" (GI 2) and "come to get [Expert 1's name]" (GI 3).

"He says we should self-dependence, slowly slowly…like…It was before committee and by this committee they can…able to…self-dependable, so it was good" (GI 1).

"We should become independent, not dependent on someone" (GI 2).

Sympathy and sense of mutuality could be seen within the community. The respondents pointed out that there are some people in the village who cannot afford the treatment even though they did not experience this problem themselves. “Someone who is really poor, he is not able to pay 20%, so she suggest if we can provide fully free it’ll be great.” “…and he has one suggestion if Swallows give all medicine fully free it will be really helpful for them because someone really poor and they can bare this 20%” (GI 3).

Social stigma arising due to arsenicosis elsewhere (see section 2.4.2) did not seem to be an issue of Miapur. Neither interviewee mentioned any kind of negative notion towards arsenic patients, nor did I observe any kind of stigmatization. The arsenic patients, including the ones with visible skin lesions, moved freely and publically in the village, without the signs of fear. They were treated equally within the group during the mapping session, group interviews, and arsenic medicine distribution camp. We can definitely contribute this state of things to TSDS’s awareness activities in the village.[37]

9.1.4 Financial capital

Human capital, especially health and ability to work, influences Financial capital of the recipients. The recipients stated the negative effects of arsenicosis on their income. These effects were reduced due support of TSDS.

“They has problem because they feel pain in hand. That’s why they don’t took work properly and they can’t work in days or they can’t walk in two days. They can’t go in day and it’s a problem to go safe…So it’s bad for their income.

Investigator (I): “So they earn less money?”

“Yes.”

I: “And how does Thanapara Swallows’ treatment or treatment provided by Thanapara Swallows help them like in financial situation?”

“Yes, because if they take medicine and they going better and better. That’s why their income also better.”

The arsenic patients shared 20% cost of their treatment. The rest was bore by TSDS. Such cost-sharing was considered helpful by the recipients.

I: “And how does it help them they don’t have to pay so much for their treatment?”

“Yes, because they just give 20% of 100%.”

I: “But how much does it help them? Can you ask them?”

[37] However, the local girls and women might have problems to get married if they suffer from arsenicosis (F. Hoque, personal communication, August 18, 2013).

"Much better. It's…he says before Swallows didn't take any money, take the medicine fully free, without cost and now take just 20 taka of 100 taka, 20 of 100" (GI 1).

However, the recipients identified the group of arsenic-affected people in the village that was excluded from the provision of treatment due to the financial constraints. "Someone who is really poor, he is not able to pay 20%…" (GI 3). This identification refers to the sense of sympathy within the community (see section 9.1.3).

The recipients share the cost not only in the treatment but also in the provision of alternative arsenic safe water sources. Interestingly, the recipients found the cost-sharing necessary to create the sense of ownership and commitment.

I: "And what do they think that they have to pay for new water resources, like RWHP or for new medicine, like they have a share, they have to give something for it?"

"He is thinking like we are thinking, yes, we have to pay something, if we pay something, we will take care it more, like otherwise if it would free, we didn't care."

"They share 20%. And he says it's good" (GI 2).

9.1.5 Transforming Structures, Policies, and Processes

Transforming structures and processes within the SLF are the institutions, organizations or companies, policies, and legislation that shape livelihoods, in this case, in the context of arsenic contamination. The recipients are directly influenced by a non-governmental organization TSDS, and by the local government and their policies and actions. The relationship between the recipients and these structures were reflected in the recipients' assessments.

On one hand, the recipients trust and rely on TSDS, as I showed before. They did not complain about the organization's work. They only "suggested" changes to existing activities of TSDS.

"He says he has no complaints against it and he also admire Swallows. And he has one suggestion…" (GI 3).

On the other hand, the local government takes rather indifferent attitude towards arsenic contamination in the village according to the recipients. It was said to provide no or only little help. No trust was expressed towards the local government. All questions about the local government brought about a heated discussion which suggests responsiveness to the topic.

"He says government doesn't help any more but someone says they give some tube well."

"No help and someone says few, help little bit."

I: "If they have any problem with water, would they think of going to the local government?"

“No. Nobody went to the local government” (GI 1).

“They [the local government] doesn’t any help.”

“They complain against government. They ask them to give tax, to give that but they don’t help any” (GI 2).

9.1.6 Vulnerability context

The Vulnerability context is important because it directly impacts people’s assets status and access to the assets. Vulnerability context manifests through trends, shocks, and seasonality. (DFID, 1999, section 2.2). The recipients did not identify any major problems regarding their vulnerability. Only seasonality in availability of water in the village was of a minor concern.

“They’re talking about one Bangla month…It’s water going place, going down, they can’t enough water. It’s not enough, not enough like other season.”

I: “And it is a big problem for them?”

“Little bit, not so much. Small” (GI 1).

9.2 The providers’ perspective

Comparison of the perspectives of the recipients and of TSDS shows the chain of aid-providers that exists in the area. Both perspectives describe the issues of participation, power distribution, and dependence arising within the chain. These issues and other categories emerging from the perspectives are further discussed.

The level of participation in arsenic mitigation in Miapur ranged from extractive to consultative. It did not reach the transformative or mobilizing level (see Annex 2.). TSDS based its work on the needs of local people. The organization actually listened to the people and gave them an opportunity to express their views. In terms of what kinds of arsenic mitigation aid TSDS provided in Miapur, the recipients’ and the providers’ perspectives agree. Both sides talked about the patient identification and treatment, screening and marking the tube wells, awareness-raising activities, and the building of alternative safe water resources (see section 9.1 for the recipients’ statements).

“…and at that time the people have difficulties with safe water and safe sanitation so our main target was work with water and sanitation” (EI 2).

“…And then we get a chance and again we shall go to Miapur. And then they [people of Miapur] will tell to us: “yes it is very necessary medicine distribution and another support, so we feel if you start again medicine or another option work like this rain water harvesting, dug well. Suppose ‘Is there safe water? What can I do?....Where I? Where I?...What can I do?’ So we are telling: ‘Yes, we are try to this is the support. But donor is agree and then we will give you this is the support’.”

"…So one time we are organize meeting in here, in Miapur and donor will present in this meeting…" (EI 1).

The organization's activities changed according to the peoples' needs. TSDS as the direct provider of assistance was even able to stand up for these needs when communicating the conditions of cooperation with big, international donors. It suggests the organization's inclination towards the recipients' needs rather than the donors' and the awareness of their own power.

"…so our working condition is started changing to arsenic site more than water and sanitation site. Since then, 2007, we were more focusing with the arsenic site. And there was 54 people who were arsenic contaminated and got the kind of disease, so we are providing medicine to those people."

"And then we came to know that Emmaus International they work with water and their main focus is water right. But in our arsenic is more danger to the area, for that reason we told ok, we want to work with water but we want to work with arsenic contaminated area. So that way we work here." (EI 2)

"We feel probably another donor will come in France, in Emmaus International. And then we get a chance and again we shall go to Miapur…So one time we are organize meeting in here, in Miapur and donor will present in this meeting. And then they will tell that 'if you not give the support, then many people is…in this disease … died, probably. So we are afraid.' And then donor tell "I shall help you". We are sitting again in Thanapara and what will be process this work in Miapur and take a decision and this program will be started" (EI 1).

To provide assistance in Miapur was a question of responsibility to the representatives of TSDS. "…Finally we found out there was arsenic in the water and then we took responsibility. We will check all the tube well around the village to see where is the arsenic level high and where is low" (EI 2).

There are different reasons that might explain why it was TSDS that "took responsibility." First, TSDS is one of the biggest and longest-working NGOs in the area and as such is very well known. It works comprehensively, in all areas of the locals' lives where help is needed and the organization is able to help (Obs; RSS). It seemed natural to the representatives of TSDS to take action in the issue occurring so close them. Another reason might lie in the round relationship between the providers and the recipients of aid. The locals do not take action themselves. They expect the outsiders to help them as well as the outsiders accept this order of things. Finally, the insufficient local government services would not have provided the needed mitigation services (see section 9.1.5).

Other factor that could be behind the TSDS's involvement in the issue is the notion of water which the organization's management holds. Water is seen as a public good that can never become a private property and a matter of trade.

"…water never can be asset, private property. It should be always public property. It shouldn't be sell to people, should be free to the people. We just can make a source from where people can take the water. But we never sell the water" (EI 2).

This implies the responsibility for the public authorities to manage water resources. If they fail to do that, the civil society intervenes––in this case, in the form of a NGO. Interestingly, such notions of water could not be found in the interactions with the recipients. Actually, no deeper, more complex notions of water emerged in the recipients' perspective at all. They perceived water only in terms of its use for their daily needs.

Not only structures, policies, and processes within TSDS influence arsenic mitigation work in Miapur. External structures, policies, and processes affect the situation as well, or even the lack of these. There are local government bodies and donors. On the other hand, neither the providers, nor the recipients identified any private company which would influence arsenic mitigation in Miapur (EI 2).

TSDS's relationship with the local government is conflict-free. However, TSDS and local government do not cooperate in the sense of joint action. TSDS ought to have permission for their work and ought to report it but "otherwise, when taking permission, we are free, we just have money and we do everything we want" (EI 2).

"In the work we are doing we have to get permission from the government. And also we have to keep cooperation with the local administration, administrative people who work in the village. So we are getting money from Emmaus, we are work here but we are having a cooperation with the government and the local administration. We just give them plan that we want to do like this, like this work and they know that Thanapara is working this site. But they never say you should do this and you should do this." (EI 2)

"In the beginning when we are giving admission to the government, they can say this type of work the government is doing, so you shouldn't do this" (EI 1).

There is the important issue of dependence emerging from the both perspectives. Empowerment of the recipients was achieved partly achieved through VDC which served as a structure that enabled self-management of a community, including making decisions and taking responsibility and action.

"In the beginning when we are working there we made a village committee we were calling VDC, village development committee. There was the people from the village. And this people also working here. They were sitting in the village and making a plan, what kind of water

activity they are going to do there. And we are supporting them and they were doing that. So it started like this work but after long time this VDC has become slowly inactive. So staff I going there, talking to different people and telling finish that.

I: So VDC was working on its own?

“Yes. But support they were getting from us. I mean, they don’t get the financial support but planning they were doing. And then they are seeing the yearly plan what they wanted to do within one month, how much they have done.

And in the beginning it was mainly, how many latrines they want to do, how many tube wells they want to do, and then they followed how much has been done and how much will be done in the future” (EI 2).

However, the providers’ ability to implement arsenic mitigation activities is derived primarily from their donors. Subsequently, whether and how the organization will work is limited. VDC stopped its activities due these constraints.

“This type of activity, more project based activity, there is time frame. So when that time is finished, even if support is needed, the donor doesn’t continue there. They move to other place, so they have to stop that area. For that reason even more support was needy here, we have to move to other area because here was 25% arsenic contaminated.

This the yearly planning we are giving and then Emmaus give plan for one year so we know this is one year and then end of this year, next year in April there will be meeting again. And if we get money, we will continue. if we don’t get money, we cannot continue. So it is yearly planning” (EI 2).

I: “So why do you think Village Development Committee stopped?”

“Because when SDC stopped giving support to Thanapara, then Thanapara would be in lack of of money continue this type of activity. For this reason we move slowly from this area and we started working quite far away from here. It’s 40km away. There is a place also. It’s very much contaminated with arsenic. It’s higher than Miapur” (EI 2).

As TSDS depends on its donors, the people of Miapur depend on TSDS. Aid is impersonated in TSDS’s representatives. Even though the recipients experienced power through VDC and expressed their desire to become independent, they still relied on TSDS in dealing with arsenic contamination. The arsenic mitigation activities were not any time initiated and managed by the people themselves (see section 9.1).

A lack of empowerment of the affected people in Miapur is demonstrated also on the access to information that the people have–not only in terms of their education and access to the

communication infrastructure, but also in terms of what kind and an amount of information that TSDS provided them. After a research conducted in Miapur found that there are high levels of arsenic presented in the local food chain, this information was at first purposely kept from the inhabitants of the village. It was done in order to save an affected farmer's income.

I: "Result of the project, of the research of this research, was that you found out that arsenic is in food chain. So what did you do about that? How did you tell it to the people?"

E 1: "We cannot tell these people. Sorry."

…

E1: "In Miapur. Is the arsenic contaminated on the food chain but vegetable is the very high, highly rate arsenic contaminated in here. So…this the farmer's name is [farmer's name]. He is the growing this one hectar…Big plot is the making a vegetable, this green vegetables. But he get a lot of money. But we cannot…the result is get from [a name of a partner institution] but we cannot tell him in…in…in farmer's. But we are tell him and they are foreign totally vegetables not sell in here. So very lost will be. So we are thinking we are tell him so what can he…So we are thinking we will tell only the farmers but they cannot tell another people" (EI 1).

As a result of insufficient access to information, the local people were exposed to the unnecessary amounts of arsenic via food chain. The farmer whose crops were contaminated still sold the harvest and people were buying it.

I: "And what did farmers do? Did they still sell the vegetables or they didn't?"

E1: "They sell the same in another market."

I: "They still sell it? Even though there was arsenic in the vegetables?"

E1: "Yeah, yeah. But we cannot tell this the market so this not sell…Very loss. Very big…Very big amount, this area, big crops, so there many cost, invest many money in this crops. So he is thinking he gets more money from here. So I am thinking this is the danger position. People is the crops is the danger who would be attracting this arsenic" (EI 1).

However, TSDS eventually informed the recipients about arsenic contamination of the food chain. "…Only men to men people cannot tell or this area's people cannot tell. In that time. But another time we are discussion, describing in this meeting this is the situation, the very highly rate in arsenic stay in the vegetable. So is the contaminated is the very highly and this vegetable is the very danger for men, for women"(EI 1).

10. Recommendations

The recommendations for future work of TSDS in Miapur issue from the evaluation findings that were presented in the previous chapter. The recommendations are framed by the concept of community development which is defined in chapter 5. The concept does not have to necessarily refer only to the community of Miapur. Community development principles and practices can be applied to all activities TSDS implements, in order to enable the development of sustainable communities and release from the deprivation trap.

Features:

Integrated approach

TSDS implemented all actions that are usually implemented to mitigate arsenic contamination of drinking water, from screening through awareness to patient treatment. However, there are other factors that can worsen the effects of arsenic contamination such as socio-economic situation of the affected people. These factors should be identified and ideally addressed alongside with arsenic contamination. For example, TSDS could involve the arsenic affected into the microcredit program that was running in the village (Expert 1, personal communication, June 10, 2013). Also, the efforts of different stakeholders in the area should be more coordinated. The joint plan of action with the local government bodies and other relevant stakeholders should be developed and realized.

Collective action

Arsenic mitigation implemented by TSDS had involved collective action particularly in the form of VDCs. But these actions ceased due to a lack of funding. The recipients did not try, nor were they encouraged by the providers to maintain collective actions. TSDS needs to involve the recipients more into the management of arsenic mitigation projects.

Needs orientation

In terms of orientation on needs, TSDS arsenic mitigation work is very good. TSDS addressed the needs identified by the affected people and changed its activities flexibly according to them. These needs were communicated clearly, so the community understood them. Such approach is desirable to continue. The only thing that can change is the level of people's participation in the needs assessments.

Objective orientation

As well as the needs, the objectives in arsenic mitigation were clearly stated. People dealt with the specific tasks such as how many new safe water resources needed to be built. This helped them to take action. The future projects should state their objectives as clearly as possible too.

Grassroots level

Arsenic mitigation in Miapur did not have the grassroots orientation. No activity was led by the community members themselves. Rather than the facilitators, the outsiders such as TSDS were the initiators and providers of change and actions towards development. TSDS and the community of Miapur need to reconsider this vertical relationship of a provider and a recipient. The relationship should become a partnership. In order to do that, there must be an actor of change who would facilitate the actions at the grassroots level. Ideally, TSDS should become such a facilitator since it works in the community for a long time.

Assets-based

The reason why TSDS had not facilitated the grassroots level of arsenic mitigation actions can be that they have never realized the assets of people that were at disposal. Such assets ought to be identified as well as the needs. Since they were not identified and not used either, they could not improve. TSDS should start building their activities around the arsenic affected people's assets, not just their needs. Thus, the people can become more self-aware, confident, and in the end, independent.

Democratic

Arsenic mitigation in Miapur was not very democratic. The local government played only a marginal role. It did not give the arsenic affected, which come from the poor rural population of Bangladesh, the active sense of ability to use their democratic rights. As in the case of ensuring the integrated approach, the bigger involvement of local government is needed than has happened so far. TSDS, the local government bodies, and the community of Miapur should work jointly and in a coordinated fashion on arsenic mitigation in the village. The community members need to be aware of and encouraged to use their rights of citizens and to participate in the democratic processes.

Successful community development activities lead to:

Awareness

Community development is to generate a kind of awareness when the people become aware of themselves, of their needs as well as assets. TSDS successfully generated awareness of arsenic contamination in Miapur. But the organization failed to support self-awareness of the local people. To develop this kind of awareness, TSDS should apply the assets-based and democratic approach, facilitating the full use of the people's potential.

Further development

Community development projects often trigger further activities leading to further development. Yet, this was not the case of arsenic mitigation in Miapur. However, if TSDS

follows the role of a facilitator, builds on the locals' assets and share leadership, such development will be achieved (see Annex 2., Table 7.).

Demonstration effect

If TSDS apply the features and principles of community development, the arsenic mitigation projects can reach success and broadcast their effects over a wide area. The projects will have not only the physical results, but also the psychological effects. The locals can see what they are capable of and what cooperation brings. Such example may spark other activities and initiatives elsewhere and serve as an example of good practice.

Learning

Learning was a part of arsenic mitigation projects. Miapur people gained a certain degree of skills regarding the maintenance of safe water resources. They had an opportunity develop management skills through VDC. They also gained knowledge on arsenic contamination and water and sanitation. Yet the learning part lacked multidimensionality, conceptuality, and the active role of the people. It is important next time the local people's learning is facilitated in a strategic manner, with their active involvement.

Community building

On one hand, arsenic mitigation work strengthened the Miapur community particularly at the practical level. It provided the locals with the safe water and sanitation infrastructure which is essential for their living as well as for their dignity. On the other hand, to build the community fully, TSDS needs to enhance leadership and institution building in the community through capacity building, collaboration and sharing the leadership responsibilities. Thus, the community will become truly self-reliant and sustainable.

Ethical principles

Human orientation

TSDS focused more at the basic needs such as a lack of safe water rather than at the abstract needs such as self-reliance. The latter are just as important as the former though. The organization should therefore pay more attention to these abstract needs, even though they might not be formulated directly. However, a lack of awareness of the people's abstract needs was compensated with a human approach TSDS holds towards the Miapur community. It is an example of good practice which should be followed further.

Participation and empowerment

People should participate in all aspects of community development projects. TSDS had involved the local people in the project management only partially. To bring about community development, the capacities of their members and the whole community need to

be built. Participation and community engagement at the highest levels of the ladders are necessary for that (see Annex 2.).

One of the primary roles of community development is to empower people––to give them the power or right to make decisions while supporting them with the necessary knowledge and skills to make good decision-making possible. TSDS partly enabled that to the community through the VDC activities. But the committee did not reach its full potential. TSDS needs to facilitate a process of self-awareness and capacity building, leading to the sustainable and self-reliant community. In a radical view, participation leads to equity. It gives the community members the power to fulfil their rights as democratic citizens. It is a question how much this can be achieved in the local context.

Ownership

A lack of ownership might have been one of the reasons why the community members did not initiate or self-manage any actions. A sense of ownership and commitment are essential for successful community development. To ensure these, TSDS needs to apply the principle of participation.

Sustainability

In the environmental sense, the existing activities in Miapur were as sustainable as it was possible in the local context.[38] It had been a small project, using the local sources and technologies. In the sense of self-dependence, the community did not achieve sustainability. The initiatives such as VDC or amendments of alternative water sources were not happening without TSDS's direct intervention.

Release

Arsenic mitigation in the Miapur community did not actually release the local people from the deprivation trap of poverty because it was not its goal. TSDS alleviated the effects of arsenic contamination but did not aspire for more. It depends on TSDS's consideration whether they should not pursue more integrated approach in the future, leading to the community's sustainability, possibly even release from the deprivation trap.

Practical principles

Remarkable about TSDS is that its staff remained all the time as human as possible in its work. The arsenic-affected people did not become just numbers or items in a pre-scribed framework. Naturally, using the common sense and sympathy, TSDS applied the practical principles of community development: learning, compassion, adaptability, and simplicity.

[38] Quality of environment and its protection is very low in Bangladesh. There are no waste and waste water treatment systems available. There is a great lack of awareness and legal provisions and their advancement.

Since the principles were followed naturally, they lacked conceptuality. The principles should become part of the organization's strategic planning, guiding their activities in the field, to achieve the best results. TSDS should particularly focus on developing the learning part—not just for its staff but also for the community members. TSDS works flexibly according to the changing needs of the community, yet developing adaptability in the sense of creativity and innovation would enhance its work even more. Finally, the NGO can serve as an example for other organizations and institutions in practising compassion and simplicity in their field work.

11. Discussion

The general objective of this evaluation study was to influence the decision-making of TSDS. The specific objectives were to assess the activities of TSDS in arsenic mitigation from the perspective of recipients and to transform them into the recommendations for TSDS in terms of community development. I achieved these objectives through qualitative data collection and analysis; using the SLF; following the principles of trustworthiness and ethics; and making a final, publically available report in the form of thesis.

The findings indicate that the projects implemented by TSDS in Miapur were successful in terms of mitigating arsenic contamination to the minimum level. The recipients were satisfied with what TSDS had been doing in their village. They perceived their work as very helpful and improving.

Natural and Physical capitals were improved the most because safe and quality water and sanitation infrastructure had been built. Human capital was developed in terms of arsenic awareness and improvement of health conditions of the arsenic affected. Analysis of Social capital showed unfulfilled potential of the people's assets, lack of capacity building and the issues of self-reliance and independence. Effects of arsenic contamination in Financial capital were reduced but the excluded group was identified by the community. The group could not afford sharing the costs for the treatment.

On one hand, the relationship of trust and dependence existed between TSDS and the recipients within Structures, Policies, and Processes. On the other hand, the recipients did not trust the local government bodies and did not cooperate with them. There were no major threats identified within the Vulnerability context.

The comparison of the recipients' perspective with the perspective of providers showed the characteristics of the existing chain of aid-providers. The chain causes the unequal distribution of power. It also hampers the community development towards self-reliance and sustainability.

I translated these findings into the recommendations in terms of community development which should have a positive impact on the decision-making processes in TSDS, leading to improvement of its work and to benefiting the community. In order to transform arsenic mitigation work in Miapur into community development, the roles of providers and recipients need to change into the roles of partners. An act of providing assistance needs to become an act of cooperation and facilitation for development. Building capacities of the community members, their self-awareness, supporting and involving them during the whole process will lead to their empowerment and to sustainable, self-reliant community. TSDS does not need to change the practical principles it follows. The organization is an example of

good practice in applying practical principles of community development: learning, compassion, adaptability, and simplicity.

This study is one of the first evaluations of TSDS's projects that have been ever done. It is a first study evaluating arsenic mitigation work of TSDS from the perspective of the recipients. The only study concerning arsenic mitigation in the village of Miapur was done by Nahar et al. (2008). Their research was aimed at the health and socio-economic effects of arsenic contamination of groundwater. The authors reached the similar conclusions as this study did. They conclude that "all respondents were aware of the arsenic problem in the groundwater. Nearly all of the respondents enjoyed the facility of having a water source (tube well) within their home arena" (p. 44). Moreover, their survey "identified a marked absence of discrimination and neglect in behavior toward arsenic victims" which is contradictory to the usual norms in Bangladesh (p. 45).

The study has its limitations. First, I conducted the evaluation in the unfavourable time which prevented the maximum level of participation.[39] Second, there were the significant cultural and language barriers. Communication misunderstandings occurred regularly between me and Expert 1 and caused complications and delays.[40] Some data got 'lost in translation', as a translator always adds their background and bias to the translation. Moreover, the respondents were not much willing to open up when interviewed.[41] Finally, the interviews were limited due to bias and assumptions on both sides, on mine as an evaluator and the local people as the respondents (see section 7.6).

Since this is the first evaluation that dealt with arsenic mitigation activities of TSDS, there is a lot more to study. Next evaluations could be done in a bigger manner with the long term engagement at the site and a wider sample. The inquiries could be done in collaboration with the community members, at the highest level of participation ladder and thus contributing to development of the community. There is also a space for the use of quantitative research methods. Thematically, it would be interesting to further examine the differences between providers' and the recipients' perspectives, especially in terms of the values and principles.

[39] It was the monsoon season and the holy, fasting months of Ramadan. The monsoon season is characterized by large amounts of rainfall, high temperatures and humidity. Ramadan is a holy month in Islam when fasting and spiritual contemplation takes place. Muslims do not eat and drink from sunrise to sunset during this month which affects their physical and psychological state.

[40] Given the multiple responsibilities that Expert 1 had and communication problems occurring between us, organization of the interviews was therefore complicated. We often arrived to the place with delay which shortened the time available for the interviews.

[41] It might be attributed to the fact that the locals, especially women were not used to discuss with the strangers. There was not enough time to establish sufficient level of trust between us. The behaviour and responses of the participants might have been also influenced by the presence of the aid-providers. I tried to minimize these factors as much as possible, being a patient and active listener, encouraging people to open up, and instructing the TSDS staff not to interfere during data collection.

12. Summary

Arsenic contamination of groundwater in Bangladesh has the vast socioeconomic effects that are interlinked and can be easily overlooked because they occur in a long-term period of time. There have been plenty of arsenic mitigation initiatives in Bangladesh, involving a number of different stakeholders. Arsenic mitigation usually consists of the screening, patient identification and treatment, awareness-raising, and provision of alternative safe water sources. Few of the initiatives used the community development practices.

One of the stakeholders involved in arsenic mitigation is a non-governmental organization Thanapara Swallows Development Society, working in the rural areas of north western Bangladesh. This evaluation study qualitatively assessed arsenic mitigation work of Thanapara Swallows from the perspective of recipients, using Sustainable Livelihoods Framework. The evaluation findings were transformed into the recommendations in terms of community development. The study aims at influencing the decision-making of the organization.

The arsenic mitigation projects implemented by Thanapara Swallows in the community of Miapur were successful in terms of mitigating arsenic contamination to the minimum level. The recipients perceived the organization's work as satisfactory, helpful, and improving. The organization is an example of good practice in following the practical principles of community development of learning, compassion, adaptability, and simplicity. However, there is a lot to be done in terms of community development. The distribution of power in the existing chain of aid-providers should be balanced towards the members of community. Building capacities and self-awareness of the community members, supporting and involving them at all stages are needed. It is necessary that the whole process is done conceptually, within the strategic planning of the organization. Thus, the community can become empowered, sustainable, and self-reliant.

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Annex 1. Table 5. Organizations in arsenic mitigation in Bangladesh

Screening	Well-switching/ awareness	Alternative safe water supply options	Evaluation of removal technologies	Patient identification/ Patient management	Country arsenic policy	Regional/country arsenic network/database
AAN BRAC BUET DANIDA DPHE Grameen Bank IDE JICA NGO-Forum NIPSOM Rotary International SDC SIDA UNDP UNICEF VERC WaterAid WB WVB	AAN ARBAN ASD AUSAID BRAC CARE DAM DANIDA DCH DOEH DPHE DSK EPRC Grameen Bank Green Hill ICDDR IDE ISDCM JICA LGED MOHFW NGO-Forum Phulki PIB Proshika Rotary Int.. SDC SIDA SUH UNDPT UNICEF UST VERC WaterAid WB WVB	AAN BRAC CARE DANIDA DCH DPHE Grameen Bank ICDDR IDE JICA NGO-Forum Proshika Rotary Int. SDC SIDA UNICEF WB WVB	DANIDA WHO CIDA DFID BRAC Grameen Bank OCETA UNICEF JICA WaterAid	AAN BRAC BRDB CARE DAM DANIDA DCH DGHS DOEH DPHE (BAMWSP) Grameen Bank ICDDR IDE ISDCM JICA MOHFW NGO-Forum NIPSOM Rotary Int. SDC SIDA UNDP UNICEF VERC WB WHO WVB	APSU (DFID)	NAMIC (BAMWSP) ACIC AAN NGO-Forum HARVARD/MIT BUET-ITN

Annex 2.

Table 6. Participation ladder with roles and responsibilities (Chambers, 2006, p.9).

	Outsider's objectives include	*Roles/Relationships*		*Actions*		*Ownership*
		Outsiders'	*Locals'*	*Outsiders'*	*Locals'*	
Totalitarian	State political control	Dictator	Slave	Command	Comply	Outsiders'
Nominal	Cosmetic legitimisation	Manipulator	Puppet			
Extractive	Obtain knowledge for better planning	Researcher/ Planner	Informant			
Induced	Gain action through material incentives	Employer	Worker			
Consultative/ Instrumental	Improve effectiveness and efficiency	Rational economiser	Collaborator			
Partnership	Share responsibility and power	Co-equal partner	Co-equal partner			
Transformative	Facilitate sustainable development by local people	Facilitator/ Catalyst	Analyst/ Actor/ Agent			
Self/mobilizing	Support spontaneous action	Supporter	Owner/ Controller	Support	Initiate	Locals'

Table 7. Community Engagement Continuum (Ley, 2013).

Increasing level of community involvement, impact, trust, and communication flow

Outreach	**Consult**	**Involve**	**Collaborate**	**Shared Leadership**
Some community involvement. Communication flows from one to the other, to inform. Provides community with information. Entities coexist. Outcomes: Optimally, established communication channels and channels for outreach	More community involvement. Communication flows to the community and back, answer seeking. Gets information or feed-back from the community. Entities share information. Outcomes: Develops connections.	Better community involvement. Communication flows both ways, participatory form of communication. Involves more participation with community on issues. Entities cooperate. Outcomes: Visibility of partnership established with increased cooperation.	Community involvement. Communication flow is bidirectional. Forms partnerships with community on each aspect of project. Entities for bidirectional communication channels. Outcomes: Partnership building, trust building.	Strong bidirectional relationship. Final decision making is at community level. Entities have formed strong partnership structures. Outcomes: Broader outcomes affecting broader community. Strong bidirectional trust built.

Annex 3.

Table 8. Relative advantages and disadvantages of ground and paper/sketch participatory maps (Chambers, 2006, p.5).

Ground maps	**Paper/Sketch maps**
More temporary, cannot keep, exposed to external influences (animals, rain, wind…)	More permanent, can be stored safely but also vulnerable to water, mould, tearing, burning…
More democratic. Many can hold the stick, less eye contact, less verbal dominance.	More exclusive. One, educated often hold the pen, presenting own more than group view.
Locally owned, outsiders cannot remove it.	Vulnerable to removal by outsiders.
Cannot be used for monitoring	Can be used for monitoring, with updating
Not convincing or usable with officials	Can empower when presented to officials
More crosschecking and triangulation	Less crosschecking, fewer may see
Power and ownership more dispersed	Power and ownership more concentrated

Annex 4.

Figure 10. The participatory map of Miapur