Sustainability of Safe Water Supply Chains for the Base of the Pyramid in Nepal

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Abstract

Water is a basic need for life, human right and public good. Nevertheless, there are an estimated 800 million people lacking sustainable access to drinking water globally. Among them are the Nepalese population, where the majority lacks access to safe drinking water due to bad infrastructure, and the focus of the government and water and sanitation stakeholders on water quantity rather than quality. In addition to this, poverty, poor hygiene habits and ignorance play a major role in increasing the prevalence of waterborne diseases. The NGO ECCA offers a promising solution with its awareness-creating program that includes the production and dissemination of WATASOL - an inexpensive chlorination product to purify water - to the base of the economic pyramid (BoP) in Nepal.

The thesis at hand analyzes ECCA's potential for scaling its WATASOL production and sales and makes recommendations to develop a future strategy to reach Nepal's BoP by pursuing a market-based development approach. It shows that reaching the poor at the BoP with a market-based safe water approach is dependent on various issues, such as a created market, entrepreneurial initiative and consistently marketed products but there are also limiting factors such as the difficult topography, a by subsidies destroyed market, wrong product positioning and people's prevalent habits.

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Table of Content

Abstract ..... **I**
Acknowledgements ..... **II**
Table of Content ..... **III**
List of Abbreviations and Acronyms ..... **V**
List of Figures ..... **VIII**
List of Tables ..... **VIII**
1 Introduction **1**
1.1 Methods **2**
2 BoP – Where we are coming from **3**
2.1 Prahalad and Hart's BoP proposition **3**
2.2 Evolution or criticizing the BoP market approach **5**
2.3.1 Infrastructure and living conditions 7
2.3.2 Informality 7
2.3.3 Market conditions 8
2.3.4 Tackling the challenges at the BoP 8
3 Market-Based Approaches for Poverty Alleviation **10**
3.1 M4P and the Value Chain Approach **10**
3.1.1 Market system 11
3.1.2 Enabling environment 11
3.2 PSD – M4P **12**
3.2.1 M4P as tool – practical steps 14
3.3 Value chains to eradicate poverty **15**
3.3.1 Definition 15
3.3.2 Value Chain Approach in practice 16
3.3.2.1 Data collection 16
3.3.2.2 Analysis 17
3.3.2.3 System and end-markets 17
3.3.2.4 Strategy design and implementation 18
3.3.2.5 Monitoring and evaluation 19
3.4 Summary market approaches **19**
4 Case Study Nepal **20**
4.1 Nepal's BoP and the "drinking" water **20**
4.2 Safe water market in Nepal **24**
4.3 ECCA and its supply chain **26**
4.3.1 Supply chain 27
4.3.2 Supplier 27
4.3.3 WATASOL the promising product 27
4.3.4 Production 28
4.3.5 Distribution, Consumer and Awareness Creation 28
4.3.6 After sales and FRC 30
4.3.7 Summary and analysis supply chain 30
4.4 The market for chlorine or WATASOL's competition **32**
4.4.1 3 Competing products 33
4.4.2 Chlorine strategies 34
4.4.3 From market size, demand and price structure 36
4.4.4 Summary WATASOL and chlorine market 37
4.5 WATASOL's future or enabling cooperation with safe water actors **38**
4.5.1 ENPHO and CRS 38
4.5.2 Helvetas Swiss Intercooperation 39
4.5.3 Nepal Water for Health 39
4.5.4 Oxfam 40

4.5.5 Urban Environment Management Society 40
4.5.6 World Health Organization 40
4.5.7 MinErgy Nepal 41
4.5.8 Australian Agency for International Development 41
4.5.9 Asian Development Bank 42
4.5.10 World Bank (International Development Agency) 42
4.5.11 Japan International Cooperation Agency 42
4.5.12 Rural Village Water Resources Management Project 43
4.5.13 United Nations Children's Fund Nepal 43
4.5.14 WaterAid 43
4.5.15 World Vision Nepal 44
4.5.16 Federation of Drinking Water and Sanitation Users Nepal 44
4.5.17 Role of the government 44
4.5.18 Summary potential cooperation 45
4.6 Underserved market segments or future customers? 45
4.6.1 Schools 45
4.6.2 Interest Groups 46
4.6.3 Urban poor and slum communities 46
4.6.4 Tankers 46
4.6.5 Clandestine jar bottlers 47
4.6.6 Street vendors and side street restaurants 47
4.6.7 Summary potential market segments 47

5 WATASOL's Future Strategy 48
5.1 Committed but lacking business perspective 49
5.2 A good product with potential 49
5.3 Failed market price and wrong product perception 50
5.4 Out-of-the-box thinking and new market segments 50
5.5 Evaluation and summary 51

6 Conclusion 52
Resources 54
Separately stated Internet Resources 58
List of Interviewees 62
Appendix 65
Appendix 1: Costs of boiling 65
Appendix 3: WATASOL cost calculation 67
Appendix 4: Market share 68
Appendix 5: CRS distribution network 68
Appendix 6: Interviews 69

Declaration of Authorship 98

List of Abbreviations and Acronyms

ADB	Asian Development Bank
AED	Academy for Educational Development
AusAID	Australian Agency for International Development
BTI	Bertelsmann Transformation Index
BEE	Business Enabling Environment
BoP	Base of the Pyramid
BRICS	Brazil, Russia, India, China and South Africa
CAWST	Centre for Affordable Water and Sanitation Technology
Cl	Chlorine
CIA	Central Intelligence Agency
CoP	Costs of Production
CRS	Contraceptive Retail Sales
CSO	Civil Society Organization
DFID	United Kingdom Department for International Development
DoLIDAR	Department of Local Infrastructure Development and Agricultural Roads
DTO	District Technical Office
DWSS	Department for Water Supply and Sewerage
ECCA	Environmental Camps for Conservation Awareness
ENPHO	Environment and Public Health Organization
et al.	Et alia
etc.	Et cetera
e.g.	Exempli gratia
FRC	Free Residual Chlorine
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GNI	Gross National Income
GTZ	German Technical Cooperation Agency
Helvetas	HELVETAS Swiss Intercooperation
HQ	Headquarters
HWTS	Household Water Treatment Solution
Ibid.	Ibidem
INGO	International Non-Governmental Organization
INR	Indian Rupee
JICA	Japan International Cooperation Agency
KTM	Kathmandu
KVWSMB	Kathmandu Valley Water Supply Management Board
l	Liter

MDG	Millennium Development Goals
mg	Milligram
MNE	Multinational Enterprise
MoFALD	Ministry of Federal Affairs and Local Development
MRP	Market Retail Price
NaOH	Sodium Hydroxide
NBWI	Nepal Bottled Water Industries Association
NEWAH	Nepal Water for Health
NGO	Non-Governmental Organization
NHSCC	National Hygiene and Sanitation Coordination Committee
NNTA	Nepal National Teachers' Association
NNTO	Nepal National Teachers' Organization
NPO	Non-profit Organization
NPR	Nepalese Rupee
ODF	Open-Defecation-Free
POU	Point of Use Water Treatment and Storage System
PPP	Public Private Partnership
PSD	Private Sector Development
PSI	Public Services International
RO	Reverse Osmosis
RVWRMP	Rural Village Water Resources Management Project
SDC	Swiss Agency for Development and Cooperation
SLTS	School-Led Total Sanitation
TSC	The Springfield Centre
UC	Users' Committee
UEMS	Urban Environment Management Society
UNDP	United Nations Development Program
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
USD	United States Dollar
UV	Ultraviolet
VCA	Value Chain Approach
WASH	Water Sanitation and Hygiene
WEF	World Economic Forum
WHO	World Health Organization
WSP	Water Safety Plan

WSSDO	Water Supply and Sanitation Division Office
WUSC	Water Users and Sanitation Committee
WVIN	World Vision International Nepal

List of Figures

Figure 1: The Economic Pyramid 4
Figure 2: The M4P Market System 13
Figure 3: Value Chain as part of a Market System 15
Figure 4: Project Implementation 18
Figure 5: Topographic map of Nepal 20
Figure 6: 60ml WATASOL Bottle, produced by ECCA 27
Figure 7: Operation of two WATA-Standards 28
Figure 8: Margins WATASOL Distribution 29
Figure 9: WATASOL School Reserve Tank & Door-to-Door Program 29
Figure 10: Coliform Test 30
Figure 11: WATASOL & Piyush at a Pharmacy 32
Figure 12: Pharmacy Survey 35
Figure 13: Margins Piyush 36
Figure 14: Water Delivery 41
Figure 15: WATASOL Mural next to a School 46

List of Tables

Table 1: HWTS (1/2) 24
Table 2: HWTS (2/2) 25
Table 3: SWOT Analysis WATASOL 32
Table 4: WATASOL's Competition 33
Table 5: Competition Place & Promotion 34
Table 6: SWOT Analysis WATASOL Project 48

1 Introduction

"Water is the driving force of all nature."
(*Leonardo Da Vinci)*

Water is a basic need for life and is perceived as a human right and public good. But only 4 billion people on earth have access to safe and piped drinking water. An estimated 800 million people, mainly living in developing countries, lack consistent access to water (WHO/UNICEF, 2014). To improve the health of these people at risk, the Millennium Development Goal (MDG) for safe water has been developed to halve the proportion of people without sustainable access to safe drinking water by 2015. This MDG was already achieved by 2010 (WHO, 2013b), but still more than 2.5 billion people, mainly living in rural areas, are at risk or even suffering from waterborne diseases due to poor water quality, water shortages and lack of access (WHO, 2013a). Not only are these people exposed to poor living conditions, but they have to survive on a daily income of 2 US Dollars (USD) or less (World Bank, 2015b) also. This heterogeneous group, mainly living in developing countries, constitutes the bottom of the global economic pyramid and is referred to as the Bottom of the Pyramid (BoP). In order to enhance the status quo of safe water at the BoP, collective efforts have to be made, due to the fact that national budgets of developing countries are not able to cover the tremendous investments necessary to meet the requirements of supplying safe water to their populations.

Already today, major efforts have been made to enhance access to safe drinking water for the world's poorest countries, not only by public sector institutions but also those in the private sector. There are numerous approaches in safe water technologies and applied business models that have identified ways to reach the BoP (Brown et al., 2011). Among them is Antenna Technologies Geneva (in the following Antenna Technologies), who has developed the inexpensive WATA technology for people living at the BoP to produce chlorine for water treatment at household levels. Its market-based development approach aims to sell chlorine to BoP consumers. By scaling the production and sales of chlorine, a feasible non-profit business can be established to reduce waterborne diseases, meanwhile creating jobs and income. Since 2008, Antenna Technologies has been cooperating with the Nepalese NGO Environmental Camps for Conservation Awareness (ECCA) who is producing and selling its chlorine branded as WATASOL.

The purpose of the thesis at hand is to analyze ECCA's WATASOL program in order to identify potential for scaling the production and sales of chlorine by making recommendations to develop a future strategy for reaching Nepal's BoP with safe water.

Accordingly, the thesis is structured as follows. The first part of the thesis will give a theoretical overview of the BoP proposition and outline actual critics, based upon which the heterogenic BoP characteristics will be examined. In order to understand market-based development approaches better, an overview of the two most prevalent approaches, the M4P and the Value Chain Approach, will be given to apply the crucial findings in the second part of the case study in Nepal. The case study examines the potential of scaling the production and sales of WATASOL. Accordingly, the status quo of safe water and the use of chlorination products in Nepal is discussed. By conducting an in-depth market analysis, the underlying constraints will be identified and potential cooperation partners and new market segments examined to address scaling opportunities and give recommendations for a potential strategy to scale WATASOL in the future. The thesis will end with an overall conclusion.

1.1 Methods

In order to compose the theoretical part, sources from academic journals, books and the Internet, with focus on the issue of BoP and market-based development approaches, have been reviewed.

For the case study of WATASOL in Nepal, the author relies on personally collected information during his field research from April to July 2014 in Kathmandu, Nepal. The gathered information comprises of semi-structured interviews with 19 (I)NGOs[1], 26 pharmacies, 5 schools, 3 local chlorine distributors, a tanker association, a slum community, a water bottling company and a water filter company and is based on personal field observations.

Additionally resources from ECCA, academic journals, newspapers and the Internet were taken into consideration to complete the research.

[1] The transliterated interviews with (I)NGOs are attached in the appendix.

2 BoP – Where we are coming from

Prahalad and Hart introduced the groundbreaking BoP concept in 1998 in a working paper and published it later with the title “The Fortune at the Bottom of the Pyramid”. The innovative concept identifies the bottom of the world’s economic pyramid as a tremendous untapped market with huge business potential. The two inventors propose that financially poor people living with only a few dollars daily should be seen as potential customers with substantial purchasing power and not as recipients of development aid (only). The authors argue that these people, roughly half of the world’s population, have been neglected by companies solely focusing on the world’s financially strong ones. Prahalad and Hart advocate a shift in paradigm for multinational enterprises (MNE) as well as for the development sector to address the people living at the bottom of the economic pyramid as potential customers. To pursue this path, private companies and development sector institutions have to innovate and develop goods and services at affordable prices that serve the basic daily needs of the world’s poorest. The authors believe their advocated approach will contribute to improve living conditions by eradicating poverty and integrating the people living at the BoP into the formal economy. (Prahalad & Hart, 2002).

The proposed approach by Prahalad and Hart has attracted significant attention in the business and development community and led to shifts in paradigm. This chapter will therefore describe the evolvement and evolution of the BoP, its characteristics and provide a critical review.

2.1 Prahalad and Hart’s BoP proposition

The world is prospering but still more than 30% of the population has to survive on less than 2 USD per day and capita. Approximately 1.4 billion people live in extreme poverty on less than USD 1.25 per day and capita, another 1.2 billion live in moderate poverty on less than USD 2 per day, together making a combined total of 2.6 billion people living in moderate or extreme poverty. A further 1.4 billion people live on between USD 2 and USD 9 per day (World Bank, 2015a). In total, more than 4 billion people are living below USD 9 per day and capita, or less than USD 1’500 per annum. This income group has been defined as the bottom of the economic pyramid (Prahalad & Hart, 2002). Various institutions have been estimating the aggregated purchasing power of these people and came up with estimates ranging from USD 2.3 trillion (WEF, 2009) to USD 5 trillion (Hammond et al., 2007) or even USD 9 trillion (Nakata & Weidner, 2012) per year with an approximate annual growth rate of 8 percent over the last years (WEF, 2009).

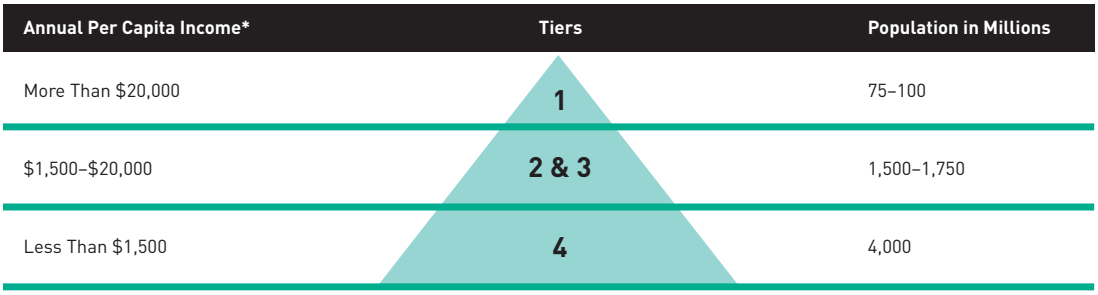

Figure 1: The Economic Pyramid (Prahalad & Hart, 2002, p.4)

*Based on purchasing power parity in US$

Regarding these numbers, the question arises why companies have neglected this customer segment and expanded mainly to the promising middle class segments in emerging markets like East Asia and the BRICS[2]. These markets do incorporate potential but not as much growth prospects as the neglected market with the aspiring poor, incorporating 4 billion potential customers, which will be part of the growing middle class in the future (Praceus, 2014).

Prahalad and Hart assume that the BoP segment has been neglected because of the following factors:

• The poorest are not today's target consumers because products are too expensive and not profitable for this market.

• The poor are not able to afford the products and services sold in the developed world and don't have a use for them either.

• The poor can use previous technologies – only the developed world looks for highly innovative products.

• The BoP is not important to the long-term success of businesses. The poor can be left to governments and nonprofits.

• Managers are not excited by business challenges that have a humanitarian dimension.

• It is difficult to find manager who are willing to work at the BoP. The focus lies on amenities of developed countries. (2002).

By overcoming these flaws and identifying the BoP as a consumer segment, companies can survive in the long run, expand their businesses, make profits and ease the life of the world's poorest (Prahalad & Hart, 2002). Immanent to Prahalad and Hart's concept is the requirement for companies to radically innovate their products and services and change business models to meet the needs of the BoP consumers. By pursuing this approach, the marginalized people can be elevated from the informal economy where they are depending

[2] Brazil, Russia, India, China and South Africa

on moneylenders and intermediaries without a choice to make into the formal economy (2002).

Several MNEs and companies have successfully tapped into BoP markets in the last decade, attracted by the tremendous potential of doing business with the poor, following Prahalad's and Hart's premise. Examples include Nokia selling a basic cell phone with a speaking clock in Brazil, targeting illiterate people (Nakata, 2012); Unilever disseminating an affordable disinfecting soap in urban and rural areas of Asia, South America and Africa to prevent diarrheal diseases (Lifebuoy, 2012); or Aravind, offering visual tests and eye surgeries to eliminate needless blindness at affordable prices in India (Aravind, 2014). Aside from these successful role models, companies are struggling to set up viable business models for BoP customers or have not been able to scale their products or services and remained small (Hammond et al., 2007).

Although the BoP approach has been well received, various scholars and representatives from the development sector have been criticizing it. Subsequently these critics will be rolled out and the implications described.

2.2 Evolution or criticizing the BoP market approach

Various scholars from different disciplines started questioning the original BoP approach after mixed outcomes and only a few unconvincing so-called success stories became public.

One of the first opposing voices was from Aneel Karnani who prominently rejected the BoP fortune proposition, regarding it as not more than a "mirage" (2007). His argumentation addresses different fallacies. On one hand he emphasizes the overestimated "untapped" purchasing power at the BoP. He argues that the poorest people in the world living with roughly USD 1 per day are not a consumer group MNEs is able to make money from. These people are spending more than 80% of their income on food, housing, transportation and healthcare. There is not much money left to spend on so-called luxury goods such as shampoo, skin cream or coffee, even if it is packed in small packages as originally proposed by Prahalad. (Karnani, 2007). Further critics raise ethical questions, saying it is morally wrong to profit from the poor, because there is a fine line between help and exploiting the situation poor people are living in (Hammond et al., 2007; Arnold & Valentin, 2013). Companies can harm the people living at the BoP with their market penetration activities by voluntarily or involuntarily exploiting the low level of literacy and product awareness by encouraging people to buy products that are not pertinent and do not enhance their living conditions. On the other side of this so-called "undesirable inclusion" stands the so-called "exclusion" of people, reflecting the circumstance that companies fail to enable BoP customers to buy products or services that improve their wellbeing (Jaisawal, 2008; Karnani, 2007).

The BoP approach offers food for thought, but simply claiming that commercial success will enhance personal and social development and lift people out of poverty reflects a shortened view (Walsh, Kress & Beyerchen, 2005; Errington, Fujikura & Gewertz, 2012).

But mere criticism does not change the world. Alternative views to Prahalad and Hart's BoP approach suggest that poverty can only be alleviated by increasing the income of the people living at the bottom of the pyramid (Karnani, 2007; Hart, 2005; Garette & Karnani, 2012). By ''creating a fortune with the base of the pyramid'' (London & Hart, 2011) rather than at the BoP, the shortened view of primarily selling to the poor can be overcome by searching for alternatives that consider the entire value chain (Hahn, 2009) and create steady income (Karnani, 2007). By viewing the poor not solely as customers, but also in other roles, such as producers, designers, suppliers, distributors and service providers (Karnani, 2007; London & Hart, 2011) poverty can be alleviated. This insight reflects the ongoing discussion of poverty alleviation. Over the last decade, several authors have been questioning the approaches pursued by the development aid industry. Among them are William Easterly (2006) and Paul Collier (2007) who emphasized that despite the billions of dollars poured South, the poor are even getting poorer. In reaction to this, they stipulate bottom-up approaches aimed towards inclusive economic growth to alleviate poverty, with the view that it is business rather than monetary aid flows that can lift people out of poverty. London identifies the following six principles for the BoP perspective: "external participation, co-creation, connecting local with non-local, patient innovation, self-financed growth, and focusing on what is right at the BoP" (2007, p.26). Such insights have influenced the market development strategies of development cooperation actors, the private sector and governments in the last decade. This thesis advocates the opinion that through smart and sustainable economic growth leveraged by market approaches, people living at the BoP can be offered opportunities that enable them to step out of poverty.

To better understand how market approaches can tackle opportunities of incorporating the poor into formal economies, one needs a decided understanding of the BoP characteristics, which will be detailed in the following section.

2.3 Characteristics of the BoP or a portrait of vulnerability

The BoP income segment is heterogenic (WEF, 2007), nevertheless are people finding themselves in similar environments. To outline the characteristics of the BoP, the aspects of the environment people are living in and the market conditions have to be examined.

2.3.1 Infrastructure and living conditions

The majority of BoP people are living in rural or even remote areas (World Bank, 2013), characterized by low-grade infrastructure such as electricity and transportation networks, telecommunications, schools, sanitation, health care, etc. (Hahn & Gold, 2014). Bad infrastructure has several constraining implications. People are not able to obtain bank accounts and do not have access to financial institutions, leaving them to moneylenders who ask for excessive interest rates. People are, by majority, living in basic dwellings with poor access to drinking water and lack of sanitation, putting them at high risk for diarrheal diseases. Health insurance rarely exists; basic health care is often far away, difficult to reach and paired with high transportation costs. (Hammond et al., 2007). The poor transportation networks implicate limited market access to products and services (Jun, Lee & Park, 2013), which causes higher prices for basic goods and services at even lower quality than for more affluent people (Hammond et al., 2007). Most of the people's budget is therefore spent on food, followed by energy, housing, transportation and health care expenditures (TSC, 2014). This leaves them vulnerable, with almost no possibility of saving money.

2.3.2 Informality

The lack of possibilities to attend school and to attain professional education leaves people poorly literate and low skilled (Anderson, Markides & Kupp, 2010) and makes it necessary for them to work and operate in the informal or underground economy, which is characterized by subsistence, self-employment or work in companies that are not legally organized businesses (Hammond et al. 2007). Without job contracts "employees" are on the edge of exploitation, violence and insecurity, bringing limited and unsteady incomes with daily or weekly wages (Prahalad, 2005; Craig & Douglas, 2011). As self-supporters, people are dependent on soil and weather and therefore highly vulnerable to natural catastrophes leaving their sources of food unpredictable and insecure (Rangan, Chu & Petkoski, 2011).

2.3.3 Market conditions

The conditions of informality co-dictate a market environment, which is characterized by low investment activities, lack of resources and access to financial institutions, and a likeliness to be inefficient. This situation has its origins often in an outdated or very weak legal framework (Anderson, Markides & Kupp, 2010) that is prohibitive and requests numerous steps to receive legal permissions to start a business (Hammond et al. 2007). The extensive level of bureaucracy is often paired with high level of corruption and nepotism (Seelos & Mair, 2007). These challenges often hinder entrepreneurs from enlarging or even starting their smallholder. If entrepreneurs are able to establish a legal business, they face further obstacles. For illiterate and low educated entrepreneurs it is often difficult to establish commercial relationships and grow because of missing market information on prices, demand and consumer behavior. (Kantimm, 2015).

BoP consumers often don't have access to information and are therefore not aware of novel commercial products. As first-time buyers with heterogeneous spending preferences and price sensitivity (Tiwari, Kalogerakis & Herstatt, 2014), producers are often facing competition with non-consumption and are in need to apply different strategies to reach BoP markets (Hart, 2010).

These circumstances of financial unpredictability, lack of developed infrastructure, limited market access, low level of information, the direct reliance on natural resources and informality leave people highly vulnerable to hunger, diseases and without a future perspective to escape the so called poverty-trap (Kraay & Raddatz, 2007).

Although Prahalad and other prominent scholars have made suggestions for private actors to enter BoP markets, the outcome has been somewhat vague. Several MNEs, either leveraged by corporate responsibility or striving for new untapped markets, have tried to enter these difficult environments with limited success. Without the supporting know-how and infrastructure development from the local government or external actors, people's conditions improve only sluggishly or stagnate and remain poor. The question remains how enterprises can enter the BoP in order to be successful. Given the market conditions at the BoP, this thesis will show opportunities how such challenges can be tackled and will give some indications how to overcome them in order to be successful to implement a business strategy.

2.3.4 Tackling the challenges at the BoP

There is no single right answer how to reach the BoP, hence the following is some food for thought that can be adapted to individual contexts and cases. First of all, it is really important to step out of the box and go beyond established business thinking by being innovative and adapting to the local circumstances (Hammond et al., 2007).

According to Rangan, Chu and Petkoski (2011), Hahn and Gold (2014) and others, key factors that have to be reassessed include products and services, distribution channels, supply chains, prices and networks.

A product or service that is intended to be marketed to the BoP has to be feasible for the needs of local consumers, has to be accepted and offer quality at an affordable price (Bang & Joshi, 2008). As consumers at the BoP are price sensitive and not eager to buy low quality products with their spare money (Rangan, Chu & Petkoski, 2011), producers have to realize innovative products and services matching quality at affordable prices[3]. Hence entrepreneurs need a willingness to invest in new approaches as well as infrastructure to develop feasible goods that improve people's living condition and value (ibid.).

Due to the fact that information channels are scarce, people do often not know about new products (Hammond et al., 2007). The process of introducing and marketing new products is therefore essential and can be achieved by awareness creation through social marketing and consumer education e.g. with product demonstrations, door-to-door campaigns, word to mouth propaganda and the involvement of local groups and networks (Heierli, 2008).

BoP markets are often in rural and remote areas, which are difficult to reach due to low infrastructure. Entrepreneurs have to develop consistent strategies to be able to distribute their products or services at affordable prices. One possibility is sourcing local knowledge or partnering with local businesses or organizations and governments to reach the poorest (Hahn & Gold, 2014).

Incorporating local knowledge is also key for reassessing supply chains. By working together with local communities, producers and distributers, income can be generated and knowledge gained from these local networks to improve the understanding of the environment and foster local entrepreneurship (Anderson, Markides & Kupp, 2010; McKague, Wheeler & Karnani, 2015).

By striving for long-term economic growth for the BoP, innovation, determination and consistency is important to genuinely involve the people and change their respective lives.

The BoP segment has not only been addressed by the private sector but has also drawn widely attention by the development sector. Different approaches have evovled in the recent years to include people living at the BoP into the formal markets. What comprehensive market-based solutions have been developed to alleviate poverty will be focused on subsequently.

[3] In this area of research the term frugal innovation has emerged as new and promising field for developing innovative quality products at low costs (Anonymous, 2010).

3 Market-Based Approaches for Poverty Alleviation

Over the last decades various private sector approaches have been developed and helped to shape the thinking and practice of today's development agencies, non-profit organizations (NPO), companies and social enterprises for the BoP.

Among the different established approaches two have prominently been advocated and implemented. The 'Value Chain Approach' (VCA) established by the United States Agency for International Development (USAID) and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), and the market development approach Making Markets Work for the Poor (or M4P), developed by the Swiss Agency for Development and Cooperation (SDC) and United Kingdom's Department for International Development (DFID) (TSC, 2014; Humphrey, 2014). By examining the content of these two crucial approaches, an understanding will be given of how market-based approaches function and what their outcome can be. In the last chapter the crucial findings will be applied to the case study of safe water in Nepal.

3.1 M4P and the Value Chain Approach

There is a necessary differentiation to be made between market-based approaches, private sector development approaches and older, more traditional approaches of development aid to understand and distinguish their respective purposes and goals.

Traditional approaches, becoming more and more outdated, focus on the poor with the assumption that they are unable to help themselves and need therefore aid to alleviate poverty (Hammond et al., 2007). In contrast stand newer market-based approaches and private sector development (PSD) approaches, recognizing economic growth and increased access to basic services as means to reduce poverty. Hence the poor are perceived as actors within a market system, able to participate and act as producers, consumers and suppliers (TSC, 2014; De Ruijter de Wildt, Elliott & Hitchins, 2006). The two approaches aim at developing solutions to improve the lives of the poor by "stimulating growth and expanding access […] to transform the systems around them" (TSC, 2014, p.3) into so-called inclusive systems. Although having the same purpose, PSD and market-based approaches pursue different procedures. PSD is a market development approach, incorporating a strategy aiming at making markets work for the poor (Humphrey, 2014; Langan, 2011) and is intervening on a macro level (DFID & SDC, 2008), whereas the VCA works directly on a micro level aiming at the improvement of smallholders' positions. Both approaches are incorporating the system around them, the so-called enabling environment (De Ruijter de Wildt, Elliott & Hitchins, 2006).

To further explain and understand the function of these two approaches better, firstly the meaning of market systems and enabling environment has to be defined.

3.1.1 Market system

Depending on the context, different definitions exist encompassing differing aspects of market systems. Two diverse definitions will be given to understand the fundamental concept.

The researchers at the Springfield Centre define a market system as follows: A market system is “a multi-function and multi-player arrangement comprising the core function of exchange and the supporting functions and rules which are performed and shaped by a variety of market players” (TSC, 2014, p.3).

On the other hand, USAID defines a market system as a system that incorporates “a value chain, its service providers and the enabling environment in which value chain actors and service providers operate. It is a system because all actors are interconnected and mutually dependent, as they interact within an enabling environment” (USAID, 2009).

Summed up, a market system is imprinted by different actors with a mutual dependence on each other within an environment that incorporates a variety of functions and is shaped by rules. What the meaning of this environment is reflects the term “enabling environment”.

3.1.2 Enabling environment

The concept of enabling environment is closely related to PSD (FAO, 2013) and is concerned with the environment businesses have to operate in and are either positively or negatively influenced by (White & Fortune, 2004). In the context at hand, one therefore often speaks of a business enabling environment (BEE) (Campbell, 2014). The spectrum of the BEE ranges from global to local environments, including all factors external to a company. A wide definition encompassing a global level, includes treaties, agreements and global market standards etc. (ibid.). On a national or local level government policies and practices and the legal and regulatory framework that influence the performance of its market shape the enabling environment. This includes access to investment and services and public infrastructure that facilitate the operation of a business (White & Fortune, 2004; FAO, 2013). Additional factors that shape the enabling environment are soft facts like business culture, the social and cultural context as well as local expectations (Campbell, 2014).

By connecting the definitions of market system and enabling environment, one realizes that the enabling environment shapes the market system in which the different market participants jointly and mutually dependent interact. Based on the earlier discussed facts that BoP markets face weak market conditions and lack infrastructure, the importance of enabling environments becomes more graspable. Various sources identified the improvement towards

a sound enabling environment as key to facilitate sustainable pro-poor economic growth (e.g. White & Fortune, 2004; Hammond et al., 2007; UNIDO & GTZ, 2008; FAO, 2013). To illustrate this important role, some examples will be given.

Operating in a weak regulatory environment can be challenging for small businesses. It is difficult to get loans to invest and improve its supply chains. By remaining small, neither jobs nor wealth can be generated, which is leading to economic stagnation or even recession (Hammond et al., 2007; FAO, 2013).

Once a sound investment environment is in place, created by government policies that allow access and transparency, not only businesses will benefit, but the society as a whole due to employment generation, increased incomes and higher tax revenues (UNIDO & GTZ, 2008). Furthermore investment can foster competition, which is playing an important role for innovation, resource-efficiency and increased productivity, which will reduce poverty in the long run (FAO, 2013). Fostering and creating an enabling environment will therefore reduce poverty through economic growth.

To what extent the concepts of market systems and the enabling environment constitute and influence the PSD and market-based approach will be examined subsequently.

3.2 PSD – M4P

As discussed previously, markets for the poor and in particular BoP markets are inefficient and tend to exclude the poor. Due to this exclusion, poor people are not able to benefit from market systems and economic growth as such. This condition identifies the M4P approach as starting point.

M4P understands itself as an approach to alleviate poverty by looking at poor people from a systemic perspective. It understands the poor as actors within a market system that is generally spoken not benefiting them. Hence the goal of the approach is to change an existing market system to offer poor people improved opportunities to participate as actors within that system. By taking a systemic point of view, M4P is able to go beyond specific target groups and individuals and can leverage change that benefits and influences many in the long run rather than a few over a limited period of time. (DFID & SDC, 2008).

The overarching goal of M4P is to achieve sustainable economic growth by changing a system to benefit the poor people and ameliorate their lives (WEF, 2009). The goal of sustainability is pursued in two ways. On one hand, the approach aims at the improvement of access to basic services such as education, health care and water and sanitation etc.. The basic idea behind this method is to enhance the living conditions, mitigate the poor's vulnerability and allow them to participate as distinct actors within the market system. On the other

hand, the whole market system shall be improved simultaneously to enhance the enabling environment for a sustainable systemic improvement. (TSC, 2014).

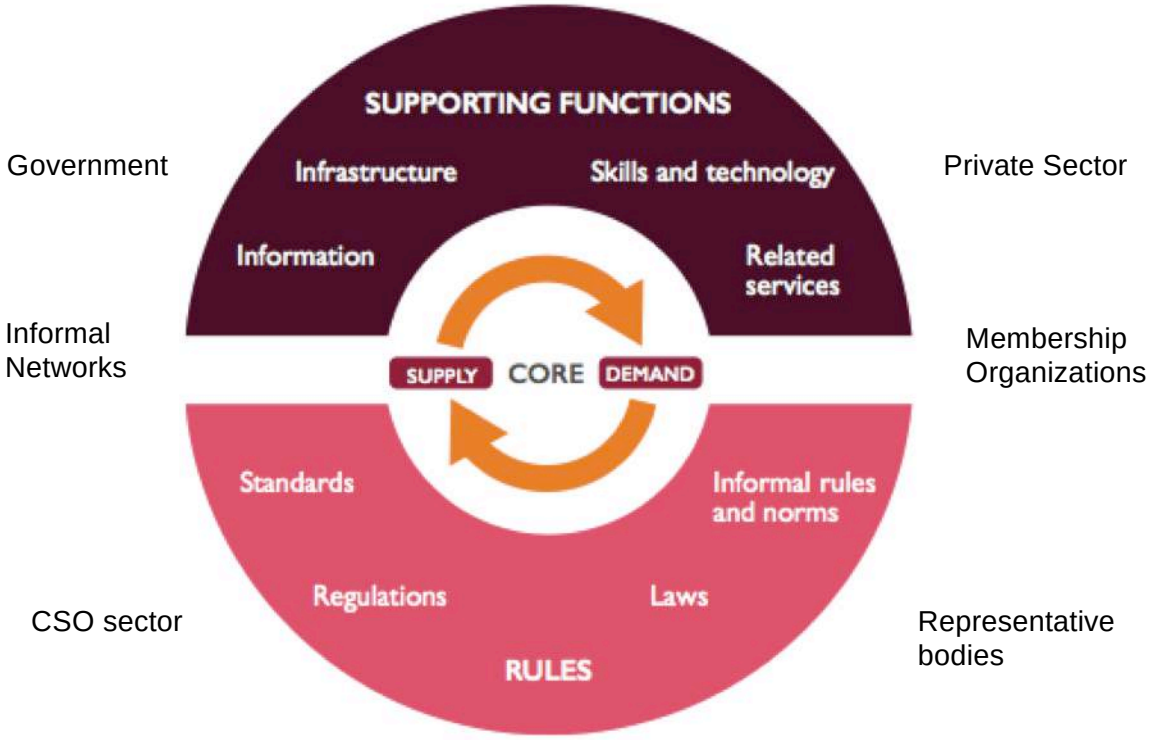

Figure 2: The M4P Market System (TSC, 2014, p.3)

To do so, the M4P approach advocates a profound analysis of a particular market system and the identification of constraining factors that hamper the performance of the system, such as inefficiency, lack of information and transparency, regulations etc. (De Ruijter de Wildt, Elliott & Hitchins, 2006). To detect these inefficiencies, the approach looks at the supporting functions, the regulatory environment and the multiple actors in the system (DFID & SDC, 2008).

The supporting functions include infrastructure, such as roads, water, sanitation; skills and technology, including the education system, research and development etc. and information meaning the transparency of the system and the availability of information regarding the market itself. Additionally, related services are included, supporting the operation of the system. (UNIDO & GTZ, 2008). On the other hand, M4P focuses on the regulatory and legal environment. This part includes laws, regulations and standards that shape the boundaries and limitations of the market system. The M4P approach completes its level of analysis with the incorporation of different actors that are involved in the market system. These include the government, private sector, different networks and civil society organizations (CSOs). (TSC, 2014).

The different levels of analysis the M4P approach includes can be understood as the analysis of an enabling environment, with the goal to improve it in order to alleviate poverty. What this can include will be examined subsequently.

3.2.1 M4P as tool – practical steps

One of the first steps is to identify the disadvantages the poor people are facing. By focusing on the causes of the disadvantages rather than its symptoms, long-term change can be achieved (DFID & SDC, 2008, TSC, 2014). It is therefore important to set priorities, out of which constraints shall be tackled first. By generating ideas how market system actors can be leveraged to change the system as insiders to benefit the poor directly and in a sustainable manner, interventions can be planned. It has to be acknowledged that interventions don't need to incorporate huge amounts of resources, but have to be perfectly adjusted to the circumstances and the goal that wants to be reached (Hammond et al., 2007). 'Pilot projects' are a commonly employed approach, where ideas are tested before they are executed on a large scale (TSC, 2014). To bring about change, intervention is required. By taking the role of a facilitator, the M4P implementer is able to stay outside the market system to stimulate and enable the different actors within the system (De Ruijter de Wildt, Elliott & Hitchins, 2006). Pertinent to the approach is that the implementer is not directly interfering in the system to preserve sustainability and to acknowledge the local ownership (DFID & SDC, 2008).

Examples of the practical M4P implementation can be the introduction of new ideas or innovations, improving networks, technical assistance, increase awareness, build capacity, support decision-makers from governments, provide information and so on. With this support, systemic change can be achieved, such as a change in practices, roles and performance of important actors, changed attitudes, new legislations and regulations etc. (DFID & SDC, 2008; TSC, 2014; De Ruijter de Wildt, Elliott & Hitchins, 2006). The listed examples show that M4P can pursue capacity building on different levels such as international, national and local levels (De Ruijter de Wildt, Elliott & Hitchins, 2006). Depending on the goal of an intervention, the level has to be chosen and defined accordingly. It is of utmost importance that the implementation of a market system approach is always planned and executed in alignment with the government of he respective country or region. Governments are key players in most market systems either as policy- and law-makers or facilitators that provide information. Therefore governments are often directly involved in necessary changes, which might cause some friction with an implementing agency. Hence one needs to be cautious to find the appropriate depth of governmental partnership to keep objectivity and independence to serve the poor the best way possible. (TSC, 2014).

As showed is M4P an approach to serve the poor at the BoP by stimulating market system change through a behavior change of market actors with the goal of achieving economic growth and expanding access to basic services for the poor. How the Value Chain Approach is linked to M4P and what its impact on the BoP segment promises will be discussed in the next paragraph.

3.3 Value chains to eradicate poverty

Value Chain (VC) approaches as well as M4P approaches take a market perspective and aim at poverty reduction through economic growth.

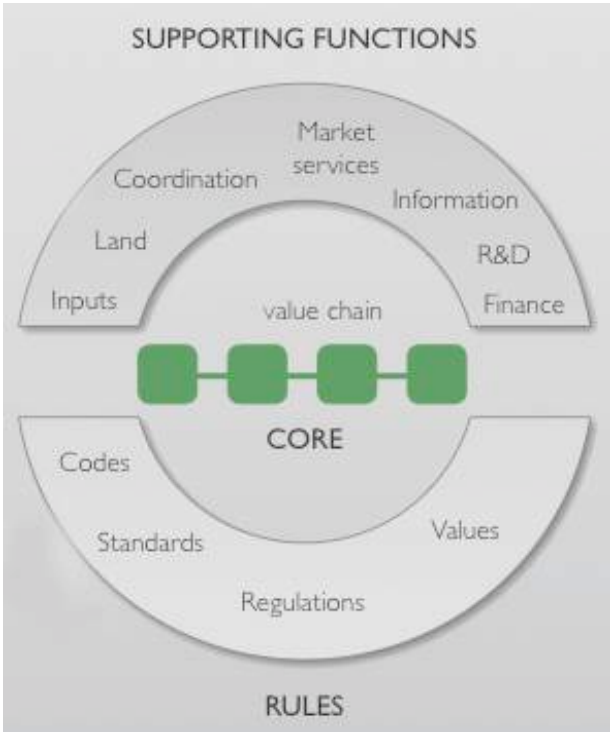

Figure 3: Value Chain as part of a Market System (DFID & SDC, 2008, p.37)

The VC approach emphasizes the importance of enabling actors within a market system. It is applicable to entities from micro-businesses to non-profit organizations and to MNEs (Herr & Muzira, 2009). In the following explanations, the author will approach the concept from a non-profit or micro-business perspective due to its relevance for the case study. Hence the concept is adapted for an environment with limited actors and manageable supply chains.

3.3.1 Definition

The concept of “value chains” looks at customers as end-markets and shows where value can be added along the supply chain.

The goal of the approach is to improve relations among market actors in an informal setting to reduce costs and enhance prevalent inefficiencies (Herr & Muzira, 2009). Hence a value chain is defined as: “full range of activities required to bring a product from its conception to its end use and beyond” (De Ruijter de Wildt, Elliott & Hitchins, 2006, p.4). These activities range from conception, to production, marketing and consumption etc. Therefore the value chain approach looks at supply chains of a product or service that ranges from “input suppliers to end market buyers” (USAID, 2009). The pursued view of going beyond the consumption of the good lies in the goal of the market development framework at hand to include disadvantaged and poor people in the system by simultaneously trying to mitigate poverty through economic growth (De Ruijter de Wildt, Elliott & Hitchins, 2006; Campbell, 2014). To achieve this goal, the VC approach focuses on enabling actors within a market system to innovate and add value to their products or services by improving its supply chain and facilitate the relationships of firms and organizations within the sector (USAID, 2009).

To make this concept useful in practice, concrete steps and tools will be introduced subsequently.

3.3.2 Value Chain Approach in practice

The starting point for improving the entire process of product conception to its delivery to end-consumers is to gather information for the analysis of the different steps within a supply chain and the end-market.

3.3.2.1 Data collection

First of all, information has to be gathered to understand the environment, the supply chain and the end-market of a NPO. Research can be conducted by applying primary and secondary research tools.

Desk research as secondary research tool helps to receive an overview of the NPO’s environment by collecting already existing data about markets, the “industry” and the country e.g. consumers, the regulatory and legal environment, macro-economic data etc. (Herr & Muzira, 2009; USAID, 2009).

Interviews (e.g. individual interviews or group discussions) are primary research tools and shall be conducted with end-consumers, producers, distributors, people from within the company and other market players that help to collect information from the entire supply chain, including the NPO and its environment. To explore ideas, evaluate trends, generate spontaneous ideas and capture social interactions, group discussions with different actors from the specific sector of interest can be helpful in addition. (USAID, 2009).

After collecting data, the segmentation of the gathered information is helpful to grasp underlying patterns and facilitate the understanding for the subsequent step of extracting the essential information and to analyze it (ibid.).

3.3.2.2 Analysis

The analytical part can be understood as a process to identify factors and conditions to improve the performance of the NPO and add value to the system. Therefore the end-markets and the supply chain itself have to be understood to identify constraints and its underlying causes that hinder the market penetration and the exploitation of market opportunities (USAID, 2009). These constraining factors need to be identified in order to address necessary changes, modify the product or service to improve the strategy at hand. Constraints can be various and range from limited resources, lack of market access to fierce competition or lack of trust between actors. (Herr & Muzira, 2009).

3.3.2.3 System and end-markets

To understand the processes within the system it is important to identify the different actors and the functions they execute to detect inefficiencies in costs, communication, distribution, marketing and so on (USAID, 2009). Additionally, it is pertinent to understand relationships among market actors to crystallized underlying constraints that hinder the performance of the system. By combining these insights with the analysis of the end-market, a future strategy can be designed and the implementation planned. (Campbell, 2014).

To develop an understanding of end-markets, the focus has to lie on the end-consumers. They determine the sales of a successful product or service determined by price, quality, quantity and timing (Herr & Muzira, 2009). Understanding customers' needs and knowing how to serve them better can achieve competitive advantage. Based on the information collected from interviews and desk research, market opportunities can be found by applying different analytical tools[4], such as:

- A SWOT analysis to identify strengths, weaknesses, opportunities and threats of the NPO.
- Benchmarking to compare competitors with one another against criteria important to buyers.
- Market segmentation to identify additional buyers with similar customers and demand requirements.
- Market positioning to identify the market positions of competitors. (USAID, 2009).

By understanding what the end-market consumer is looking for, knowing the competitors and what the own NPO's strengths and weaknesses are, the second part of the analytical part is completed. Combined with the findings from the value chain analysis, deficiencies can be approached by establishing a future strategy that copes with constraints and leverages processes. (Herr & Muzira, 2009).

[4] These tools are proposed by the USAID VC framework and are just a selection of various tools applicable for market development activities.

3.3.2.4 Strategy design and implementation

A strategy serves as road map to move an NPO towards scale by achieving a sustainable increase of the NPO's impact within the system to serve the poor better (USAID, 2009). Based on the analytical findings, the strategy identifies ways to overcome the underlying constraints that hinder the performance of an NPO to achieve sustainable impact. The VCA specifically aims to improve the value chain in general and fosters cooperation among value chain actors to achieve inclusion. If cooperation is not possible due to unwillingness or significantly diverging strategies and goals, a strategy has to be adjusted accordingly (Herr & Muzira, 2009).

To implement a strategy, two different approaches can be distinguished: the direct intervention approach and the facilitation approach.

Direct intervention means the direct delivery of services by development agencies to local actors to upgrade small firms or NPOs or subsidize the production or delivery of a good. This still apparent, more traditional approach has been challenged by practitioners (e.g. DFID & SDC, 2008; USAID, 2009; Humphrey, 2014). As evidence shows, direct interventions are destroying competition and are often unsustainable in the long term and hence contradictory to the premise of market approaches.

On the other hand stands the facilitation approach that advocates the stimulation of the system without becoming actually part of it (DFID & SDC, 2008). In practice, this approach is more difficult to pursue because an in-depth understanding of the environment is required to identify the right actors to assign responsibility to. If the right local actors can be identified for the implementation process, local ownership, commitment and self-responsibility will be enhanced and knowledge and experience generated that foster the long-term impact more sustainably and will enhance the system as a whole (USAID, 2009). Compared to the direct delivery approach, patience is needed as results will appear over time.

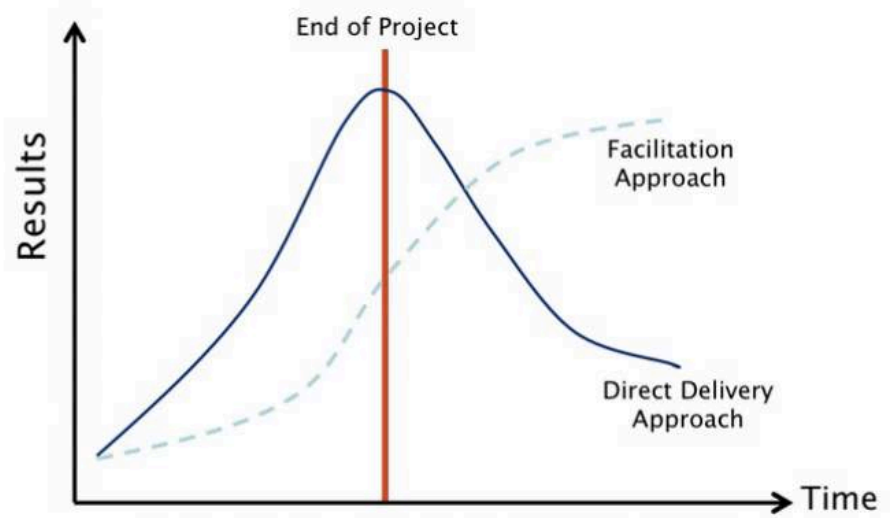

Figure 4: Project Implementation (USAID, 2009)

"Identifying the right levers and market players that can ensure sufficient scale" (Herr & Muzira, 2009, p.160) is therefore essential for a successful and sustainable implementation process. To be able to adapt perfectly to the local circumstances, the design of an implementation process should be revised and readjusted throughout the process and is based on continuous learning, the so-called monitoring and evaluation process.

3.3.2.5 Monitoring and evaluation

The process of monitoring and evaluation is critical to project implementers to assess the impact of a respective project. It is an ongoing process, starting at the beginning of a project throughout its implementation and afterwards. Accordingly the quality can be improved, actions taken and strategies readjusted to achieve long-term sustainable impact. (USAID, 2009).

3.4 Summary market approaches

As discussed, market approaches are holistic in nature, to tackle poverty alleviation through economic growth. In comparison to the M4P approach, which focuses more on a macro-level of market systems and tries to shape the environment in an integral manner, the VC approach looks precisely at market systems including supply chains from a value-adding point of view. This micro-level perspective entails change at the core of market systems by including the business environment, but in a more narrow way than M4P. This fact brings some concerns and critics from M4P advocates, questioning the sustainable impact on the system as a whole (Humphrey, 2014). This concern is legitimate and meanwhile some sort of an inherent trade-off between top-down and bottom-up intervention advocates. Both approaches have their advantages and legitimation, either by enabling a specific group or by aiming at changing a system as whole. Hence there is no need to opt for a specific approach, both have their equal right for implementation and don't mutually exclude each other or can even be applied together to specifically see how underlying constraints on a micro level do influence the macro level of a system. (De Ruijter de Wildt, Elliott & Hitchins, 2006). But what is of utmost importance is the adaptation of the respective approaches to local circumstances by applying creativity and flexibility to establish successful strategies that are adjusted accordingly to serve the poor best (Hammond et al., 2007; TSC, 2014).

The insights gained from the overview of market-based development approaches shall be applied to the case study of the chlorine market in Nepal. For this purpose the author will approach the analysis of the situation of chlorine from a market approach perspective by applying the fundamental insights gained so far.

4 Case Study Nepal

After obtaining some pertinent theoretical insights, the case study at hand focuses on the Nepalese NGO ECCA (Environmental Camps for Conservation Awareness) and the supply chain of its water chlorination product WATASOL.

By drawing from the insights gained in the previous chapters, the status quo of safe water and the use of chlorination products in Nepal is investigated, to develop a new market strategy for scaling up the production and sales of WATASOL tackling the current challenges at hand.

To realize this outline, firstly an overview of Nepal's BoP and its water infrastructure will be given to understand the end-market and its environment. Secondly, the NGO ECCA [in the following ECCA] and its activities and supply chain will be introduced to get an overview of the status quo. To understand the market situation and identify underlying constraints for the scaling of WATASOL, the competition will be presented, a product comparison executed, a SWOT analysis and an in-depth market analysis given, including the analysis of different actors within the safe water cluster. They case study will conclude with presenting recommendations for a future market strategy to scale WATASOL.

4.1 Nepal's BoP and the "drinking" water

Nepal, the landlocked country between China and India, 77 percent covered with hills and mountains, well known for the Himalayas and tragically gained notoriety in April 2015 for the disastrous earthquake, ranks among the world's poorest countries.

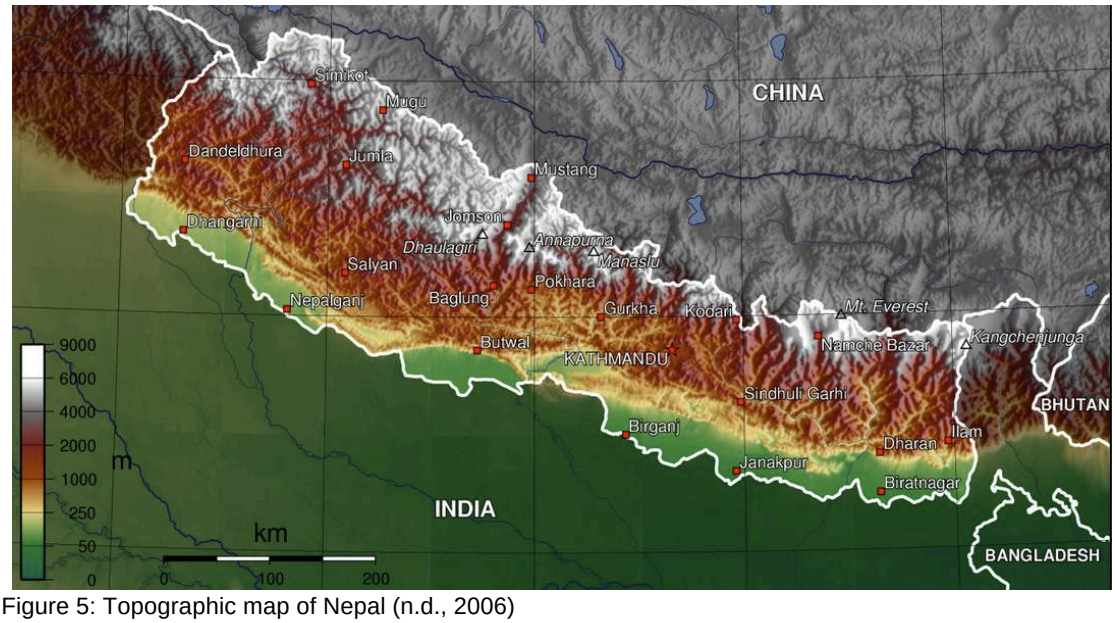

Figure 5: Topographic map of Nepal (n.d., 2006)

Prolonged political issues have overshadowed the country in the last decades resulting in a weak investment climate, growth dependent on agriculture and few private-sector jobs (World Bank, 2015c). These circumstances are reflected in the United Nations Human Development Index of 2013, which measures the achievements of a country regarding welfare, quality of life, literacy[5] and life expectancy. Nepal is positioned at 157 out of 187 countries (UNDP, 2015). In 2013 the per capita income stood at USD 750 (CIA, 2013) with 57.3 percent of the 30 million inhabitants living with less than USD 2 per day and 23.8 percent under the poverty line of USD 1.25 per day (UNDP, 2015), reflecting a tremendous BoP segment. More than 40 percent of the population received remittances from abroad, contributing 28 percent of the gross domestic product (BTI, 2014). Nevertheless, Nepal's poverty has been reduced in the last decade, due to high foreign aid as well as the significant remittances from abroad. However, the income disparity is still high with a Gini coefficient of 0.32[6] (BTI, 2014) and poverty particularly prevalent in rural areas. The elite in place is often criticized for having benefited the most of foreign aid during the political instability in the last decades (Burke, 2013), whereas the poorer have been excluded from opportunities of improvement due to ethnicity, caste, language, religion or gender (BTI, 2014).

Nepal is further characterized by rurality with 82 percent[7] of the population living in hilly and mountainous areas, deprived by very low accessibility due to few paved roadways. More than one-third of the people in the hills are more than four hours away from a well-paved road and can reach their villages only through steep and dirt paths (World Bank, 2015c). A further lack of infrastructure is found in the power supply, with its load shedding (rationing of electricity for certain periods of time to certain areas while meanwhile the other areas are without electricity) that poses complications to daily life and industrial production.

Besides electricity is the collection and delivery of water also a major concern. Despite the fact that Nepal is among the richest countries in terms of water resources, possessing more than 6000 rivers (WEPA, 2010), water is scarce, especially in the Kathmandu valley, home to more than 2.5 million people.

In the Kathmandu valley, the government is capable of daily supplying 80 million liters of water during the dry season and 150 million liters during the rainy season. But the daily demand of approximately 350 million liters cannot by any means be matched by the central distribution system (n.d., 2013a). Several residents of certain municipal areas explained that especially during the dry seasons of winter and spring, water is rationed and is only available every 4 days (Khatri, R., 2014). Not only is the piped water insufficient, but it is also not safe

[5] The literacy rate of the population above 15 is rather low, with 71% of men and only 44.5% of women in Nepal able to read.
[6] The Gini coefficient shows the income distribution among the population. The coefficient ranges from 0 – 1, the higher the coefficient, the more unequal the distribution.
[7] With a relatively high relative annual growth rate of 3.2%, urbanization is increasing.

to drink. Shrestha et al. tested piped water in the Kathmandu valley extensively and detected coliform bacteria in 37 percent of the samples and free residual chlorine (FRC) in only 44 percent[8]. This is due to irregular or missing treatment with chlorination powder at the source, or the contamination of well treated drinking water during the distribution process, due to old pipes, leaks and the fact that water and wastewater pipes run closely to each other (Dangol, 2014; Pokhrel, B., 2014; Shrestha et al., 2013).

The undersupply in the Kathmandu valley provokes people to look for alternative water sources such as dug wells, tube wells, springs, stone spouts, rivers, tanker supply, rainwater, and forces them to rely on water jars[9] and bottled water to meet their needs (NHDR, 2014; Shrestha et al., 2013). These sources are not any less precarious regarding their purity. Even up to 30 percent of bottled water (jar and smaller sizes) can be contaminated with bacteria, as a survey by Bishankha et al. (2012) showed.

Unlike in the Kathmandu valley, people in rural areas are facing less water scarcity and less contamination due to lower density of population and less waste (Pokhrel, B., 2014), but other problems such as contamination from arsenic and iron are prevalent (Shrestha, Parikshit, 2014). In the hilly regions people do have access to spring water, but the difficulty that people are facing in these steep and hardly accessible areas is the time consuming procedure of accessing and transporting water, especially during the raining season when omnipresent landslides can damage sources. In the Terai region, the flatlands of Nepal, ground water is the most likely source of water. Wells and hand pumps can be easily installed to access these water sources, although it is likely to be contaminated by iron and arsenic and can be easily contaminated during the rainy season (Basnet, 2014).

Despite these facts of contamination, surveys of the World Bank (2015c) and the UNDP (2015) state that 88 percent of Nepal's population has access to "improved drinking water sources". This categorization is deceiving and does not reveal the water quality. It only indicates that there is a well or public tap that people do have access to. Hence it is not surprising that waterborne diseases such as diarrhea, cholera or typhoid rank among the top ten leading diseases in the country (CIA, 2015). Especially during the monsoon months when floods can contaminate the water sources easily, such epidemics are numerous and rising and cause high child mortality in Nepal[10] (ECCA, 2014).

[8] Free residual chlorine is the chlorine that is left over in the water after reacting with contaminations such as bacteria and viruses. The amount indicated by the WHO should range between 0.4 and 0.5 chlorine (Cl) mg/l in an environment that is likely to be contaminative. In Europe the tap water usually ranges between 0.1-0.3 Cl mg/l. Free residual chlorine is an indicator that a sufficient amount of chlorine is in the water and its potable. Additionally it protects the water for a limited period of time (due to volatilization) from recontamination. Hence the absence of FRC in water is an indicator for contaminated water. (Levi, 2004).

[9] Water jars are in Nepal commonly used 20l water bottles suitable with or without a water dispenser.

[10] In Nepal 10'500 children under the age of 5 die from diarrhea alone every year (ECCA, 2014).

As evidence shows, only sound and expensive bottled quality water can assure potability in Nepal. There is a high probability of contamination when drinking untreated water which puts people at risk. (Pokhrel, B., 2014; Maharjan, 2014). Extensive awareness campaigns from the government and INGOs (such as USAID and World Vision) spread on TV, and in public (Shrestha, Prachet, 2014), have shown the risks of drinking untreated water and have offered various treatment options, which has raised awareness among the Nepalese population. But still there is a commonly shared belief that water is safe to drink unless it is visibly turbid. Therefore many people treat their water only selectively (Shrestha, Padmaja, 2014). Such evidence makes it apparent that changing behavior is key to fighting needless waterborne diseases. An established term for this procedure is “social marketing”, meaning the creation of awareness to bring about behavior change (Heierli, 2008). A variety of NGOs use social marketing tools and have introduced different approaches to making safe water accessible to Nepal’s population. A widely spread solution is the treatment of water at the household level with household water treatment solutions (HWTS) or “Point of use water treatment and storage systems” (POUs) (ibid.). Subsequently the different HWTS available in Nepal will be discussed to get a first overview of the safe water market in Nepal.

4.2 Safe water market in Nepal

Various INGOs, NGOs, private sector actors and the government of Nepal have been advocating HWTS to assure potable, safe drinking water. Table 1 and 2 show the different options that are available in Nepal, among them chlorine, one of the most inexpensive treatment options.

Method	Price [in Rs.]	Advantages	Disadvantages	Market Position
Collodial Silver filter (Candle filter)	• 1300-1800 (Blum, 2013) • 2-3/day	• Easy handling • Reduction of bacteria and • Time savings compared to SODIS and boiling • Fragile	• Initial investment • Easy breakable • Less efficient against viruses • Low lifespan (exchange candle after 7000l for Rs. 100-150) • Low filtration rate 1l/hr • Recontamination possible • Proper cleaning needed (if turbid water used) (Blum, 2013)	• Household level • Rural • Average household
SODIS	• Bottle (0-120) (Personal Observation)	• Negligible costs • Good against bacteria and viruses • Easy use • Unlikely recontamination	• Time consuming • Sunlight needed • No residual protection • Volume limited • Not for turbid water (SODIS, 2011)	• Household level • Rural areas • Poor people
UV/RO - Household-filters	• 6000-60'000 (Tibrewala, 2014) • high initial costs	• Effective against all forms of bacteria and viruses • No recontamination • High flow rate • Very safe • Various features possible	• High initial costs • Not against highly turbid water • No residual protection • Periodic maintenance needed • Power supply needed • Filter change every 6 months (n.d., 2013)	• Household, hotels, hospitals, offices (depending on its size) • Upper middle class (Tibrewala, 2014)
Tulip filter	• 600-1200 (Khatri, 2014) • 2-3/day	• High flow rate • Good against bacteria and pathogens • Well protected • Innovative technology	• No residual protection • Less efficient against viruses • Lifespan (exchange candle after 7000l for Rs. 150) (Khatri, R., 2014)	• Household level • Urban and rural areas • Average household (Khatri, R., 2014)

Table 1: HWTS (1/2) (own illustration)

Method	Price [in Rs.]	Advantages	Disadvantages	Target Group
Arsenic filter	• 3000-5000 (Thakur et all., 2011) • 1/day	• High flow rate • Reduces arsenic and iron • Good against turbidity • Easy to use • No chemicals used • Long lifespan (30 years) • Locally produced	• Not proven in removing all bacteria and viruses • High initial costs • Fix installation - not mobile • Large size • Not effective as stand-alone treatment • Risk of recontamination • Exchange of iron nails after 2-3 years (Rs. 400) (Thakur et all., 2011)	• Household level • Terai Region • Subsidized • Average household
Biosand filter	• 3000-5000 (Shrestha, 2014) • 1/day	• High flow rate • Good against turbidity • Easy to use • No chemicals used • Long lifespan (30 years) • Locally produced	• Not proven in removing all bacteria and viruses • High initial costs • Fix installation - not mobile • Large size • Not effective as stand-alone treatment • Risk of recontamination • Maintenance needed (Rs. 500) (Dangol & Spuhler, 2013)	• Household and small communities • Middle class household
Boiling	• Firewood (10-15kg/day) (Ligtenberg, 2007) • Kerosene 13/20l LPG 14 /20l (see Appendix 1)	• Easy available and accessible • Easy to use • Socio-cultural acceptance • Effective in reducing pathogens • Likely in hilly regions (weather)	• Time consuming (boiling / firewood collection) • Costly • Environment unfriendly • Danger of scalding • Not against turbidity • Risk of recontamination (Nepal et all., 2010)	• Household, restaurants, lodges • Applied in every segment • Favored during winter time
Ceramic filter	• 800-1900 • high initial costs	• Easy handling • Reduction of bacteria • Time savings compared to SODIS and boiling • Lifespan (if it doesn't break)	• Initial investment • Less efficient against viruses • Easy breakable • Low filtration rate • Recontamination possible • Proper cleaning needed (Shrestha & Shrestha, 2011)	• Household level • Average household
Chlorination	• Solution 20 • Tablets 100-140 e.g. Aquatabs (Neupane, 2014) • Bleach. Powder • 1.6/day (see Appendix 1)	• Cheap • Against bacteria and viruses • Easy handling • Location independent • Residual protection against recontamination	• Smell and taste • Not against turbidity • Against biological contamination only (not all parasites) • Problem with FRC (dosing) • Availability in remote areas	• Household level • Average household • Unwealthy people • Communities

Table 2: HWTS (2/2) (own illustration)

Mainly NGOs distribute or sell (often with a subsidy) these solutions parallel with social marketing activities to create awareness (Blum, 2013). Marketed as illness preventing systems, the different solutions inherently compete with each other. In the middle of this situation one finds chlorine, produced and distributed by ECCA, Environment and Public

Health Organization (ENPHO) and Public Services International (PSI). How ECCA and its WATASOL specifically emerged shall be discussed subsequently.

4.3 ECCA and its supply chain

ECCA was established in 1987 to work in the area of social mobilization and community development. Until now the NGO has been implementing various programs throughout Nepal to improve the quality of life of the population "through the wise-use of available local resources and applying alternate and renewable technologies" (ECCA, n.d.).

In recent years, the focus of ECCA's work has been raising awareness in the area of water, sanitation and hygiene (WASH). In 2008 ECCA launched its WATASOL production, in cooperation with the Geneva based NGO Antenna Technologies. WATASOL, a chlorination solution to purify contaminated water, has been developed by Antenna Technologies as branded product with the aim to establish a viable business with the production and sale of WATASOL as an aspirational treatment alternative to other established HWTS. (Antenna Technologies, n.d.).

ECCA is producing WATASOL at its headquarters in Kupondol, in the district of Lalitpur[11], with the so-called Antenna-WATA-device [in the following WATA]. Hereby a concentrated solution of active chlorine [in the following chlorine] is produced from salted water through an electrolysis process[12]. With one liter chlorine solution 4'000l of water can be purified (Antenna Technologies, n.d.). ECCA has set up a WATASOL production and is running 2 WATA-Standards, with the capacity to produce 20 liters of chlorine every day. In 2013, 2211l of the solution have been sold to different customers (ECCA, 2014).

To see what potential for scaling exists within ECCA the supply chain, including the product features, production process and its capacities, the customers and the distribution will be reviewed subsequently.

[11] Lalitpur is one of the 8 districts located in the Kathmandu valley.
[12] For further information please refer to Appendix 2.

4.3.1 Supply chain

As discussed in previous chapters, a supply chain ranges from input suppliers to end market buyers (Campbell, 2014). Regarding this definition comprises ECCA's supply chain of suppliers, its product, the production and the distribution to various customers including the after sales FRC testing through social workers.

4.3.2 Supplier

ECCA is working together with two suppliers: a plastic manufacturer, where the 60ml and 1 liter bottles are individually produced for a price of 7.45 Nepalese Rupees (NPRs) and NPRs 20 per piece respectively, and the local print shop which sells the bottle stickers at a price of NPRs 2.15 and NPRs 5 (for the 1l bottle) respectively to ECCA[13]. 20'000 bottles and labels have been ordered and are stored at ECCA's headquarters. For additional materials, a production time of 1-2 weeks has to be factored in. (Chitrakar, Angel, 2014). Additionally is salt locally purchased as production means (Shrestha, Bipin, 2014). Antenna Technologies serves as supporting entity that introduced the WATA technology to Nepal.

4.3.3 WATASOL the promising product

Liquid chlorine is not new to Nepal's consumer. Many people know Piyush or WaterGuard (Pandey, 2014). Nevertheless, the consumer needs some instructions to use chlorine appropriately. At first the water to be treated needs to be free of turbidity, hence a cloth filtration is needed when the water is turbid before the use of WATASOL. 3 drops of the 0.6% chlorine solution have to be added to one liter of water or 10ml to 20 liters of water accordingly. After 30 minutes purification time the bacteria and viruses are killed to avoid waterborne diseases. The remaining FRC prevents the water from recontamination (Antenna Technologies, n.d.).

Figure 6: 60ml WATASOL Bottle, produced by ECCA (Source: Author, 2014)

In addition to water treatment, WATASOL offers a scope of applications, such as cleaning fresh fruits and vegetables, washing clothes and general cleaning purposes (ibid.).

Since WATASOL's launch in 2008, several improvements have been made. On one hand, the shelf life has been increased through a chemical stabilization process to 6 months from originally 1 month. In addition, the product design has been changed to an appealing but still informative version. This has been well perceived by consumers, nevertheless are there often complaints about the remaining chlorine smell in the water that one has to get

[13] For further details, please refer to Appendix 3.

used to. Other consumers raise questions about the potential harm[14] of chlorine. (Maharjan, 2014). Despite these complaints are consumers satisfied with WATASOL and appreciate the easy handling, the low price and in particular the outcome of safe water (Shrestha, Bipin, 2014).

4.3.4 Production

Every week, WATASOL is produced on a regular basis between 2-3 times, depending on the demand of distributors, NGOs and the current program activities. This reflects a just in time production. As the current demand can easily be served within a week, no forecasting exists.

Figure 7: Operation of two WATA-Standards (Source: Author, 2014)

As described earlier, two WATA-Standards (WATA) are in use with a production capacity of 20 liters of chlorine every 15-20 hours. The chlorine is produced over night, then the pH[15] is tested to adjust the running time of the WATAs accordingly. To set up the production, execute the testing and subsequently stabilize the chlorine one person has to invest 5 working hours (Khatri, Rabindra, 2014).

After the production, the desired amount of bottles is filled with the help of a 20l bucket having an attached spigot. Alternately a bottle is filled and the lid attached until the required amount of bottles is reached.

For the labeling, stickers are attached to the bottle and packed into boxes or bags, depending on the purpose. The whole procedure is executed manually and is therefore time consuming. One person is able to fill and pack 300 bottles per day reflecting 2min/bottle (Shrestha, Junu, 2014).

This production process results in production costs of NPR 14.05 per 60 ml bottle and NPR 50.73 for the 1l bottle respectively[16].

4.3.5 Distribution, Consumer and Awareness Creation

ECCA sells WATASOL in 60ml flasks at fairs and exhibitions and directly to a few shops in the neighborhood at a price of NPR 20. Additionally, the stabilized chlorine is sold to

[14] So far, no longitudinal analysis has been made about the effect of the long-term use of marginally dosed chlorine on the human body. The WHO provides some standards, that the concentration in water should not exceed 0.5 mg/liter (WHO, 2013a).
[15] With the pH test the concentration of the chlorine can be determined and the running time of the WATA adjusted accordingly to reach a pH of 11 (Antenna Technologies, n.d.).
[16] For detailed cost calculations and further information please refer to Appendix 3.

institutions, hospitals and slum communities in 1-20 liters throughout the year. WATASOL is either picked up directly or distributed by motorbike or by foot to the customers.

In addition to this, 60 ml flasks are sold via two distributors through an independent distribution network to 50 pharmacies in the Kathmandu valley (Neupane, 2014).

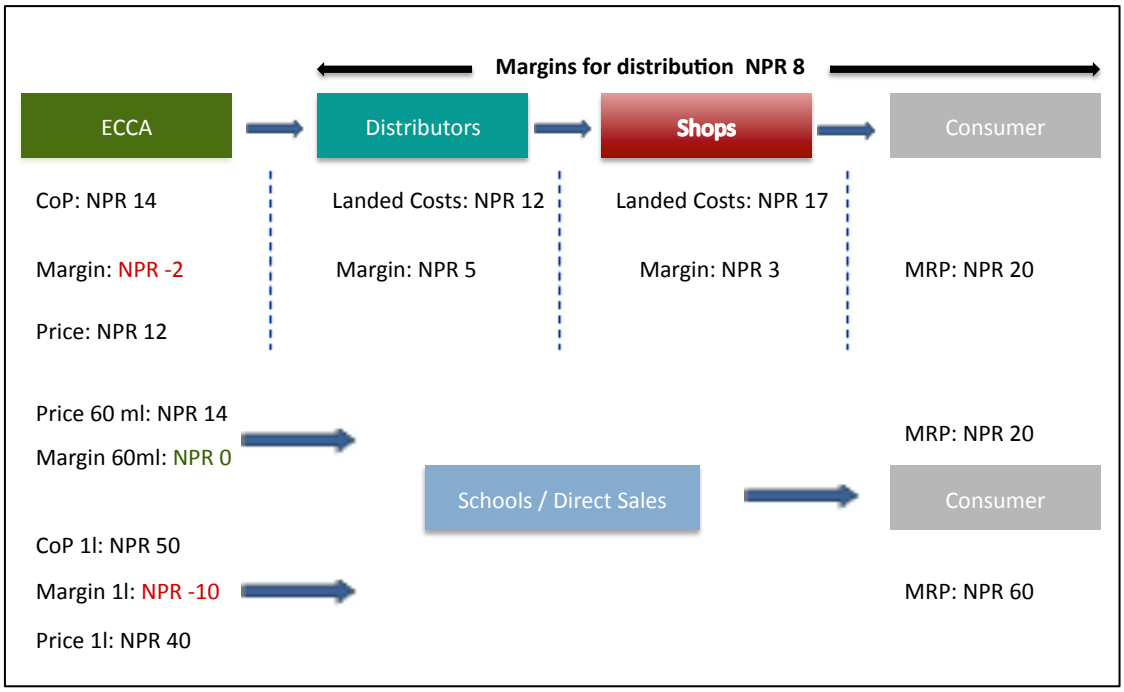

Figure 8: Margins WATASOL Distribution (own illustration)

With the idea to scale the sales of WATASOL and to raise awareness among students, a school program called “Nature Clubs” has been launched. Since its start, roughly 100 schools have successfully implemented the “Nature Club” program to produce the school’s own WATASOL (ECCA, 2014).

The Nature Clubs comprise students from different grades that have an interest and willingness to learn more about environmental issues, gardening, safe water and the use and production of chlorine (and other WASH-related topics like hygiene and sanitation).

Figure 9: WATASOL School Reserve Tank & Door-to-Door Program (Source Author, 2014)

By applying a teach-the-teacher approach, the Nature Club members are trained in producing chlorine with a Mini-WATA[17] to treat the water at school. Excess chlorine is either used for cleaning purposes or purchased by teachers or pupils to treat their water at home. To create awareness among students, the Nature Club students put on plays, showing the other children the effect of untreated water and how easy it is to use chlorine to circumvent waterborne diseases.

The Nature Club members also create awareness within the community through "safe water awareness campaigns" by conducting door-to-door campaigns. For this purpose, the teenagers go from door to door in their communities and explain people the risk of untreated water and waterborne diseases. Meanwhile they sell the 60ml stabilized chlorine provided by ECCA. For each bottle they sell, NPRs 6 help to fund their Nature Club activities during the year. The door-to-door campaigns are monitored by social workers from ECCA that support the students to reflect and improve their strategy. Additionally, Nature Clubs raise awareness by painting murals at their schools, holding stands during festivals and at schools (selling WATASOL and creating awareness), as well as many other activities.

4.3.6 After sales and FRC

During awareness programs in different communities, the water of potential consumers is tested with a coliform test[18] and additionally after the WATASOL treatment a FRC test is conducted with WataBlue[19], a non-toxic and inexpensive reagent developed by Antenna Technologies to measure the level of free residual chlorine in water (n.d.). This test indicates if enough chlorine has been added to the contaminated water to assure potability.

Figure 10: Coliform Test (Source: Author, 2014)

4.3.7 Summary and analysis supply chain

By looking at the ECCA's supply chain, one discovers potential to scale up in the future. As of 2013, 2211 liters of stabilized WATASOL have been produced, and the production limit of more than 5000 liters per annum has not been reached yet. But to scale up the production and achieve a sustainable business, there are some limiting factors in place.

Nepalese authorities have not certified WATASOL itself yet. To receive a certification, WATASOL would need to be produced in a certified laboratory (Shrestha, Prachet, 2014;

[17] Which the school buys, sometimes subsidized, sometimes not, depending on the circumstances.
[18] Tests are available for NPRs 100 at ECCA (Shrestha, Bipin, 2014).
[19] For detailed information please refer to http://www.antenna.ch/en/research/safe-water/wata-description

Chitrakar, 2014); at the moment WATASOL is produced in one part of ECCA's office and not in a real laboratory. By obtaining certification, it is believed that more trust among consumers could be generated (Maharjan, 2014). But to achieve the required standards for the certification of a laboratory, sophisticated equipment, thorough monitoring and reporting and adjusted routines and processes are needed. This bears a high investment that ECCA is at the moment not willing to make, due to the uncertain business-wise sustainability of the approach (Shrestha, Prachet, 2014).

WATASOL as product offers an inexpensive proposition to eliminate waterborne diseases. But still some problems are at hand such as the question of quality check at household levels to assure potability consistently. Without continuous FRC testing a sufficient FRC level[20] cannot be guaranteed to assure safe water. Unfortunately do consumers conduct this procedure only rarely.

Furthermore, the positioning of WATASOL is not clear. WATASOL has been developed as aspirational, not cheap POU for the poorest people among the BoP. Currently WATASOL is only partly sold to this consumer group (only slum areas) and it is not perceived as aspirational, but as cheap water treatment solution. This leads to the question of pricing. At the moment sales of distributors, 1l bottle direct sales and sales of the Nature Clubs are loss-making. Hence to achieve sustainability, the price structure needs reconsideration. Nevertheless, the Nature Club activities have raised awareness among the population and have helped to increase the recognition of WATASOL as product, however, recognition is still low.

As many WASH professionals indicate, awareness creation is essential and pertinent to convince people to treat their water. Especially in rural areas, there is a prevalent conviction that water, which appears to be clean needs no treatment. People have not been treating water for decades and therefore don't understand the pertinence of it. They live with waterborne diseases and accept it. Hence, habits and ignorance create a tremendous obstacle to reaching scale, as well as hindering steady consumption (e.g. Maharjan, 2014; Battha, 2014; Shrestha, Padmaja, 2014) and are underlying constraints.

Distribution is fundamental to scale. At the moment, ECCA's distribution capacity is limited to the urban area of the Kathmandu valley. To reach rural areas where 25 million people live, there is currently no capacity in place. One essential factor is the shelf-life of only 6 months, which makes it not feasible to reach deprived remote areas of rural Nepal due to low accessibility (Pandey, 2014).

[20] The FRC testing checks the level of free residual chlorine in the water. If 0.3-0.5 mg/l have been reached the water is ready for carefree and safe consumption.

To summarize the features of WATASOL and its supply chain, the insights are brought together in a SWOT analysis:

Strengths:	**Weaknesses:**
- Affordable - Easy to use - Prevents waterborne diseases - Multi-purpose use (cleaning, washing and purifying)	- 30 mins water purification time - Taste and smell of treated water - Not as appealing as a filter - Only for bacteria contamination → more effort needed if water is turbid - No FRC test // No security that the water is really safe to drink - Not applicable if water is turbid - No trademarked brand - No certification - Shelf-life - Limited distribution capacity - Chlorine is positioned for the poor - but not really purchased by these people
Opportunities:	**Threats:**
- Position as aspirational product - At scale it can become a self-sustaining model	- Filter market is innovating to reach BoP - Jar and bottled water - Turbid tab water limits application and therefore sales - Water scarcity - Awareness creation is necessary

Table 3: SWOT Analysis WATASOL (own illustration)

To further investigate the potential of chlorine in Nepal, the current market of chlorination products, WATASOL's competition, and the market size have to be examined.

4.4 The market for chlorine or WATASOL's competition

Nepal has had a market for chlorination products for more than a decade when WATASOL joined WaterGuard and Piyush in 2008. Since 1994 ENPHO has been producing and distributing Piyush as a social product to eliminate waterborne diseases. With the support of funding from different donors Piyush's production and sales increased steadily until 2005 the newly introduced WaterGuard entered the market. The WaterGuard project was funded by USAID and implemented by PSI (Pradhan, 2014). Due to tremendous promotion activities and the distribution of free samples, with the idea to create long-term demand (Blum, 2013), WaterGuard achieved a market share of up to 85%, with sales surmounting 600'000 bottles between 2006 and 2009 (CAWST, 2011). Meanwhile Piyush's market share dropped to less than 20 percent with sales ranging among 40'000 bottles. After WaterGuard's major promotion funding phased out in 2010, sales dropped until the project ended in 2013. Today only a few products can be found in the market (Pradhan, 2014). Meanwhile, Piyush gained

Figure 11: WATASOL & Piyush at a Pharmacy (Source: Author, 2014)

market share by setting up a broad awareness campaign funded by Academy for Educational Development (AED) and sold among 600'000 bottles in 2010 (CWAST, 2011). After ENPHO's promotion funds phased out in 2013, sales decreased rapidly (ENPHO, 2013). In combination with some problems in the production, Piyush was not readily available in the market throughout and sold 90'000 bottles in 2013. Since 2008, ECCA increased its market share to 17% for total sold chlorine and to 9%[21] in the small flasks market today.

The achievements and failures of the past shall be analyzed to draw for the proposal of a new strategy for scaling WATASOL. To do so the products and strategies shall be compared.

4.4.1 3 Competing products

Category	**WATASOL Since 2008**	**Piyush Since 1994**	**WaterGuard Since 2005**
Product			
Features	• 0.6% chlorine solution • Produced by WATA device • Introduced 2008 • 60 ml bottle • 3 drops per liter • Can treat 240 l of water • Shelf-life of 6 months • Not certificated • Not trademarked yet	• 0.5% chlorine solution • Diluted solution * • Introduced 1994 • 60 ml bottle • 3 drops per liter • Can treat 400 l of water • Shelf-life of 18 months • Certificated production • Trademarked brand	• 0.72% chlorine solution • Diluted solution * • Introduced 2005-2013 • 240 ml bottle • 3 drops per liter • Can treat 1000 l of water • Shelf-life of 18 months • Certificated production • Trademarked brand
Effect	• Cleans water from bacteria and viruses • Residual protection against recontamination	• Cleans water from bacteria and viruses • Residual protection against recontamination	• Cleans water from bacteria and viruses • Residual protection against recontamination

* Liquid chlorine solution is imported from India and diluted in the laboratory befor sale (Shrestha, Padmaja, 2014).

Table 4: WATASOL's Competition (own illustration)

The three competing products are very similar in their content and usage, although diverse chlorine concentrations are used (Roth & Walther, 2012), which result in diverging FRC levels after the water is treated. But there are some even more significant differences. Compared to WATASOL, ENPHO[22] and PSI produce their chlorine by diluting an imported chlorine solution from India that results in a 3 times higher shelf-life. This is a comparative advantage to WATASOL, especially in the context of low accessibility of Nepal's rural areas. Furthermore Piyush and WaterGuard are one step ahead regarding the chlorine's legal status and have trademarked brands with a certified production. This advantage is used to build trust among consumers and helps to guarantee quality (CAWST, 2011).

[21] For the calculation and further details, please refer to Appendix 4
[22] Originally Piyush was produced with an "electric-powered chlorine generator, using sodium chloride" (CAWST, 2011). Due to lack of electricity and unsatisfactory results in quality, this approach has been substituted with the production through diluting imported chlorine (ibid.).

4.4.2 Chlorine strategies

Category	WATASOL	Piyush	WaterGuard
Place	**Manifold strategy**	**Twofold strategy**	**One-dimensional strategy**
Target Group	• Schools and Communities • Households • Slum Communities • NGOs	• Urban and rural people, who can't afford expensive filter systems	• Main focus on households in rural areas
Sales 2012/13	• **8'952 bottles (60ml)** • **1'674 liter** • **Mainly urban market**	• **91'706 bottles (60ml)** • **24'016 Piyush Plus (200ml)** • **Urban: 40%** **Rural: 60%**	• approx. 1'000 bottles Peak in 2007: 0.5mn sales Target was 1 mn bottles • **Mainly rural market**
Market Share*			
Total Chlorine	• 17%	• 80%	• <2%
Small flasks only	• 9%	• 90%	• <1%
Distribution Method / Sales Channel	**Decentralized Distribution** • 2 Distributors reaching 50 medical shops • Door to Door campaigns to reach communities • Sales at Schools	**Decentralized Distribution** • CRS distributor Network	**Decentralized Distribution** • Product was manufactured by a local manufacturer and distributed via distribution network
	Centralized Distribution • Direct sales from ECCA at Fairs, Exhibitions and Essay competition • Direct sales from ECCA to Shops NGOs Slum Communities	**Centralized Distribution** • Direct Sales to (I)NGOs like WHO, UNICEF, Oxfam etc. • Direct sales to the Government of Nepal for disaster relief	• Medical Representatives were supporting the sales process
Promotion			
Social Marketing	• Live demonstrations • Nature club trainings • Door to door campaigns • Community trainings • Documentary shows	• Live demonstrations • Awareness programs • Community trainings • Piyush stalls	• PSI was responsible for the marketing strategy and its execution
General	• Posters (rarely) • Stickers (existed one day) • Flyers (Instruction for use) • T-Shirts • Caps (existed one day) • Pens (existed one day) • Bags • Banners (1) • Hoarding boards • Flip charts (few) • Wall paintings at schools	• Posters and Flyers • Wall paintings • T-Shirts • Bags • Key chains • Pens • Hoarding boards • PIYUSH branded micro-bus • Street dramas • Radio Jingles	• Posters • Print media advertisement • Radio advertisement • TV advertisement • Jingles
At Shops	• None	• Posters (some) • Display stands (some)	• The project has been stopped
* see Appendix	(Khatri, R., 2014; Shrestha, P.K., 2014; Shrestha, B.K. 2014)	(ECCA, 2012; ENPHO, 2013; Pandey, 2014; Shrestha, Padmaja. 2014)	(PSI, 2014; CAWST, 2011; Anonymous, 2014)

Table 5: Competition Place & Promotion (own illustration)

WATASOL and its remaining competitor Piyush have some similar elements in their distribution and promotion strategies. Both raise awareness among communities with live demonstrations and are pursuing their own social marketing activities. So far ECCA has a unique approach of raising awareness in communities through student campaigners, who also produce and sell WATASOL. This approach is sustainable as means of awareness creation and community mobilization, but there has no additional efforts been made or strategies developed to start a sustainable market approach incorporating additional "commercial" marketing activities like radio commercials or posters. Beside school neighborhoods where door-to-door campaigns have been taken place, people are not aware of the existence of WATASOL. This reality is reflected in a short survey of 26 pharmacies in Lalitpur, where pharmacists have been asked what water purification means they are selling.

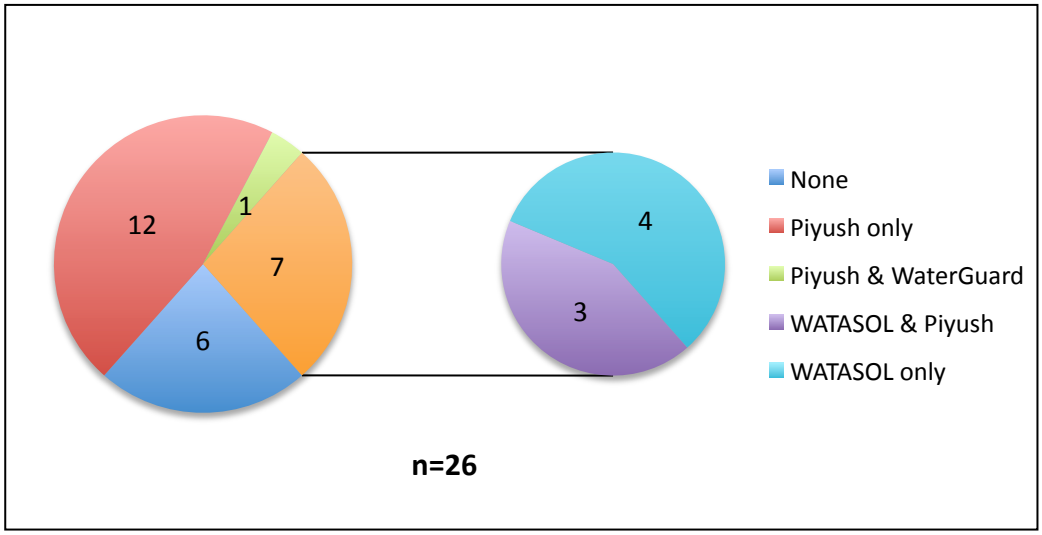

Figure 12: Pharmacy Survey (own illustration)

The survey revealed that out of 26 shops only 7 are selling WATASOL, whereas 16 have Piyush available. Shopkeepers who sold WATASOL explained that people are not aware of WATASOL because there are no posters or other means of advertisement that increase the recognition among the population. On the other hand they stated that Piyush has sometimes problems to be readily available in the market.

In contrast stands ENPHO's distribution network of CRS. CRS is highly experienced in developing marketing strategies for the BoP market and has over years a sophisticated distribution network established that reaches even the most remote areas of Nepal[23]. With its knowledge and thanks to the AED and USAID funding, Piyush is well recognized in the rural and urban market of Nepal. Complementary to its past market creation activities in communities stands its commercial advertisement such as jingles, posters and the micro buses, which enable them to reach and attract consumers. (Pandey, 2014). Nevertheless, the execution of this distribution strategy is based upon donor funding and is not sustainable in itself.

[23] For detailed information refer to Appendix 5.

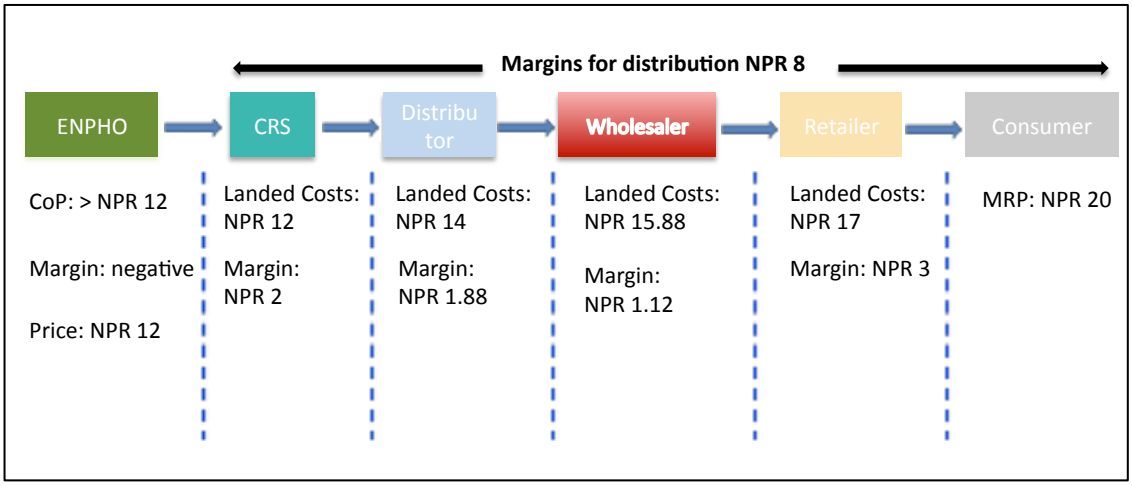

Figure 13: Margins Piyush (Pandey, 2014 - own illustration)

As ENPHO states, the costs of production (CoP) of Piyush are over NPR 12 (although there are no exact cost calculations). The product is cross-financed with the other activities of ENPHO's laboratory (water testing etc.) or subsidized by donor funding. For 2014 ENPHO has no funding received. (Shrestha, Padmaja, 2014).

4.4.3 From market size, demand and price structure

Referring to ENPHO, the actual demand of the household market ranges between 200'000-300'000 bottles a year (Shrestha, Padmaja, 2014), CRS believes that the market can reach 600'000 bottles per year (Pandey, 2014). In 2013, the sales stood at 101'658 small flasks[18]. Reasons behind the declining demand are manifold. Facts show a positive correlation of sales with promotional activities, weather conditions (natural disasters), emergencies (cholera outbreaks, earthquakes) and the demand of (I)NGOs and the government (ibid.). This is reflected in the perception of several safe water market actors that the chlorine sales are a seasonal business with high demand during the rainy season (May to September) and low sales during the winter time (Maharjan, 2014; Pandey, 2014; Bhatta, 2014). Additionally, the availability of the product is pertinent for sales. Blum states that 75% (n=600) of people would buy chlorine if it was readily available (2013). This fact has been confirmed as Piyush has problems with availability in the market due to production constraints induced by gaps in their funds (e.g. Pandey, 2014; Shrestha, Padmaja, 2014). These facts are reflected in an increasing demand for competing POUs like filter systems, because of chlorine's struggle to be present in the market (Blum, 2013).

Looking at the price structure of chlorine reveals an additional triggering factor for demand. As history shows has water always been perceived as free public good in Nepal (Pokhrel, B., 2014). Hence paying for water treatment is closely tied to this paradigm (Battha, 2014; Maharjan, 2014). Especially in rural areas people have a low or inexistent willingness to pay, which is a major constraint for the dissemination of HWTS and not chlorine products only. In combination with the reluctance to change behavior, there are substantial obstacles

for the HWTS disseminating sector. Given these constraining factors ENPHO and ECCA are hesitating to set a price that enables them to break even. WATASOL and Piyush flasks are sold at a market retail price (MRP) of NPR 20. Reasons behind this price structure are manifold. The too low price has been established over time, on one hand as means to create demand, and on the other hand, due to the presence of project funding, there have never been incentives to establish a sustainable market price. Even when WATASOL entered the market in 2008, trying to establish a sustainable market approach, it adopted the prevalent price of Piyush, fearing not to be able to sell at a sustainable price. This fact, in combination with the prevalence of subsidies, influenced not only the market price but also the consumer perception of chlorine. Consumers perceive chlorine as a cheap water treatment solution and not as an inexpensive and aspirational product to purify water, which makes consumers reluctant to buy chlorine.

4.4.4 Summary WATASOL and chlorine market

The market presence of WATASOL is increasing with sales up to 9'000 bottles and 1'600l in 2013. But the brand is only recognized among consumers where ECCA's school programs are implemented. This fact bears positive and negative points. ECCA's strengths definitely lie in the implementation and execution of its school programs and the production and familiarity with the product. But due to the focus on implementing school programs, an entrepreneurial perspective is missing and this hinders the initialization of a sustainable scaling strategy. In addition to this constraining factor, facts show that the subsidized market approaches from WaterGuard and Piyushin trying to create demand have failed and have led to a non-sustainable market price and a misperception of chlorine in the Nepali market. Currently the market is somewhat damaged, leaving a set market price that implies negative margins for WATASOL. A right selling price might lie between NPR 25-30, depending on the marketing activities and sales numbers. Simultaneously these activities have led to a wrong perception of the product as cheap and not aspirational, leaving the lowest level of the BoP untapped.

To overcome the challenges at hand it is important to address the underlying problems in a holistic manner. On one hand, the relationship between the competing market actors could be facilitated by a cooperation of ECCA and Piyush. A second step is to evaluate potential interest in cooperation among other stakeholders from the safe water sector and lastly the identification of new market segments is pertinent to see if there is further potential for scaling.

4.5 WATASOL's future or enabling cooperation with safe water actors

Various interviews have been conducted with the main actors among the safe water cluster in Nepal to identify potential cooperation partners to scale the production of WATASOL and to identify the interest of supporting a potential nationwide chlorination campaign to achieve safe water access for everyone.

Not all identified institutions were willing or capable to discuss the issue[24], hence the presented perspectives and positions are somewhat selective and not per se terminal. This overview will be presented subsequently and incorporated in the proposed future strategy.

4.5.1 ENPHO and CRS

Mrs. P. Shrestha, Senior Program Manager ENPHO and Mr. Amid Pandey, Senior Marketing Executive CRS.

To identify the potential of a possible cooperation between ECCA and Piyush, two different meetings have been held with the following outcome, Shrestha states: "**We have our own product so right now we do not think about WATASOL"** (2014). ENPHO's mission is to reach people as an NGO for its social mean to meet people's needs, but not to set up a social business. According to Mrs. Shrestha, ENPHO is looking for new funding for its marketing and production activities to pursue its ancestral strategy of selling a subsidized Piyush in the future. As Piyush is well recognized in the market, ENPHO does not see any advantage in teaming up with another chlorine producer. Future plans are to consider a price increase if no funding can be achieved, and to trademark its product Piyush Plus (1% chlorine solution) to penetrate the market further[25]. (Shrestha, Padmaja, 2014).

Summed up, ENPHO is not interested in cooperating with ECCA as a partner in terms of a market-based approach to sell chlorine sustainably.

CRS, on the other hand, is considering a cooperation in the future. As company who is marketing social products, there is no issue with competition. Unless WATASOL fulfills WHO standards and reasonable margins are in place, CRS is willing to talk about marketing another product beside Piyush. (Pandey, 2014).

[24] Care Nepal was reluctant to discuss the issue, as well as, PSI, GIZ, Red Cross Society Nepal, Save the children, the Delegation of the European Union to Nepal, USAID and the Government of Nepal.
[25] At the moment is Piyush Plus sold to NGOs and the government for emergencies.

4.5.2 Helvetas Swiss Intercooperation [Helvetas]

Mr, Madan Bhatta, Team Leader Water Resources Management Program and Mr. Yogesh Pant, Governance and Advocacy Coordinator Helvetas.

Helvetas is focused on establishing access to safe water and sanitation in villages in the far West of Nepal. In their projects, orientations on 4 water purification options (boiling, filtration, SODIS and chlorination) are conducted. Helvetas emphasized the importance of changing habits through awareness campaigns (Pant, 2014).

The idea to launch a nationwide project is appreciated and the idea of having a competing product beside Piyush would enhance the market conditions. Nevertheless, there are concerns about the practicability of a business-wise self-sustaining project in place due to the enormous constraining factors of accessibility in remote areas and the consumer perception that water has to be accessible free of charge. (Bhatta, 2014). There are good opportunities to work together with local bodies and communities and demand will be in place when people are convinced of using chlorine, despite its smell and taste (Pant, 2014), but “for the future, we can imagine to use the product if it’s available in the area of our work for demonstration purposes – but we can not invest into a business at the moment. We do not do that with Piyush either” (Bhatta, 2014).

4.5.3 Nepal Water for Health [NEWAH]

Mr. Santosh Basnet, Manager Technical Division NEWAH, Nepal and Mr. Ratan Budhathoki, Knowledge Management and Advocacy Manager NEWAH Nepal.

NEWAH as project implementer of WaterAid and AusAID has broad knowledge and experience in the WASH sector in the Terai region and hilly areas of Nepal.

Mainly working on securing water supply and safe water awareness creation, NEWAH implements rainwater harvesting as well as spring water sourcing projects. If problems are occurring with biological contamination, chlorine solution or chlorination powder is initially provided for free. Accessibility, especially in remote areas, is a major problem and even if people would like to purchase treatment options, the market access is very limited (Basnet, 2014). Mr. Budhathoki states: “**It is the right time to launch a campaign but I am not sure if it will work out in terms of a sustainable business idea […]”** (2014). At the moment NEWAH has no capacity to invest money in a nationwide campaign, but if it will be initiated in collaboration with the Government of Nepal, NEWAH will definitely join and contribute its knowledge (Budhathoki, 2014).

4.5.4 Oxfam

Mrs. Biju Dangol, Program Officer Oxfam.

Oxfam is among Nepal's leading INGOs in the WASH sector and is cooperating with ENPHO for emergency relief purposes.

During emergencies, Piyush is delivered for free to affected communities. During normal situations Oxfam Nepal delivers awareness education to the people, promoting 4 different HWTS options (chlorination, boiling, filtration and SODIS). Dangol states that awareness creation is precious, especially among rural communities, as they often don't treat their water at all. She emphasizes that working in line with the government's agenda is essential for a national campaign (2014).

The Program Coordinator for Oxfam's Humanitarian and Disaster Risk Reduction Program, Bimal Gadal, states that OXFAM is interested in the idea of a nationwide chlorination campaign and is now exploring options for future cooperation with Antenna Technologies directly.

4.5.5 Urban Environment Management Society [UEMS]

Mrs. Guheswori. Tuladhar, Team Leader UEMS, Nepal.

UEMS is working in the southern part of Lalitpur, doing WASH campaigns among communities to enhance access to safe water and sanitation.

Recently UEMS stopped the promotion of Piyush because it was not available anymore in the project area. At the moment they are using chlorination powder in their projects, which is distributed for free. To buy WATASOL could be an easier option for their community projects. Mrs. Tuladhar is interested in supporting a nationwide campaign and will check possibilities with the NGO board and its donors and will stay in contact with ECCA (Tuladhar, 2014).

4.5.6 World Health Organization [WHO]

Dr. Sudan Panthi, National Professional WASH Officer WHO Nepal.

The WHO is focusing on the implementation of the Water Safety Plan (WSP)[26] and provides technical support to the Government of Nepal.

According to Mr. Panthi, water quality and quantity is a major issue in Nepal. The WSP is currently seen as the only holistic solution that includes all water suppliers and water service providers to achieve together water supply for Nepal. A fully implemented WSP will be sufficient and will include monitoring and water quality assessment, but at the moment the capability of implementing the WSP from the government side is in question, as high invest-

[26] For further information please refer to http://newah.org.np/index1.php?option=information&id=6 or http://www.wsportal.org/templates/ld_templates/layout_1367.aspx?ObjectId=30315&lang=eng

ments are due. Until the WSP is thoroughly implemented, people have to use HWTS, while the government can gradually improve the whole water supply and treatment infrastructure.

Regarding a nationwide campaign, Panthi states that Nepal is far behind regarding water quality, and that the Nepali government is mainly focusing on sanitation and access to water: **"I think it is the right time to do something for water quality, otherwise it's impossible to improve the public health"** (Panthi, 2014). The steering entity for such a campaign would be the National Hygiene and Sanitation Coordination Committee (NHSCC).

The WHO is considering purchasing WATASOL in the future, due to the fact that Piyush is not always available in the market (Panthi, 2014).

4.5.7 MinErgy Nepal

Mrs. Rojita Maharjan, Programme Officer MinErgy Nepal.

MinErgy is a small NGO implementing projects for various (I)NGOs and governmental development agencies. Its main focus lies in eco-friendly and renewable energies at household and industrial level.

As partner of Antenna Technologies, MinErgy is working in the brick kilns, using WATA devices to sell WATASOL to workers and their families. Besides this, the NGO is focusing on urban poor communities and water entrepreneurs to sell with WATASOL purified water. MinErgy is advocating a combination of biosand-filtration and chlorination to effectively treat water. For Mrs. Maharjan, the most challenging part of awareness creation is the struggle against habits. For her, social marketing is pertinent and essential to achieve long-term behavior change.

Figure 14: Water Delivery (Source: Author, 2014)

MinErgy is willing to support the scaling of WATASOL and has already some promising pilots running to achieve scale (e.g. with street vendors, bus drivers and restaurant). (Maharjan, 2014).

4.5.8 Australian Agency for International Development [AusAID]

AusAID is cooperating with governments to strengthen the governments' systems, as well as cooperating with experienced INGOs.

In Nepal, such trusted partners include World Vision, Oxfam or WaterAid. They support the government in delivering effective health and education services for all, increasing access to clean water and sanitation, and providing support for rural livelihoods. Australia's development assistance does not work directly with small NGOs and is therefore not able to

support a nationwide campaign, unless supported by the Government of Nepal. (AusAID, 2013; AusAID, 2014).

4.5.9 Asian Development Bank [ADB]

ADB as a development bank is mainly working together with and through governments by providing loans for specific projects.

ADB's projects in Nepal focus in particular on physical infrastructure such as agriculture, transportation, education, health, water supply and economic growth by improving business environments and employment.

For those development issues, the ADB is beside the government working together with INGOs, bilateral organizations and the UN bodies. The ADB does not directly support NGO initiatives, only if they are supported or initiated by the Government of Nepal or INGOs. Therefore the ADB is not able to directly support a nationwide chlorination campaign at the actual stage. (ADB 2014; ADB, 2013).

4.5.10 World Bank (International Development Agency)

Mr. Rajib Upadhya, Senior External Affairs Officer, World Bank Nepal.

The World Bank, and more particularly the International Development Association (IDA) as one of the World Bank's institutions, is working together and through the government by offering loans and grants to the world's least developed countries. In Nepal the IDA is mainly working on infrastructure projects, covering roads, school projects, electricity, and water as well as food security by cooperating with the Government of Nepal and small enterprises. The IDA does not cooperate with NGOs.

The focal point for water lies in improving access and quantity of water especially in rural areas of Nepal. Besides this, there is support for the improvement of sanitation and hygiene matters in the rural areas too. For the future, if there is a national campaign, approved and supported by the government, there might be a possibility to get a small funding. (Upadhya, 2014).

4.5.11 Japan International Cooperation Agency [JICA]

Mr. Bidhya Pokharel, Program Manager JICA Nepal.

The Japan International Cooperation Agency is cooperating and supporting the Government of Nepal for water supply and infrastructure projects. In these terms they are not working in the field and do not contract with local NGOs directly. (Pokharel, 2014).

4.5.12 Rural Village Water Resources Management Project [RVWRMP]

Mr. Parikshit Shrestha, Technical Specialist RVWRMP.

The RWSSP is working in the rural areas of Nepal to achieve improved health and fulfill the equal right to water and sanitation for the inhabitants of the project area.

The project, a bilateral program of the Government of Nepal and Finland, is being facilitated by DDC [District Development Committee] with support from local NGOs. The program is being executed by MoFALD [Ministry of Federal Affairs and Local Development] / DoLIDAR [Department of Local Infrastructure Development and Agricultural Roads]. There is also a close linkage with DTOs [District Technical Officer] and WSSDOs [Water Supply and Sanitation Division Office] at local levels. For a nationwide campaign, these levels will be important for the implementation.

Furthermore, the project uses chlorine during the rainy season in its water schemes to disinfect water. RWSSP is recommending Piyush as POU, because it is available in the market. There will not be any direct support for WATASOL itself, but for the dissemination of chlorine products in general. (Shrestha, Parikshit, 2014).

4.5.13 United Nations Children's Fund [UNICEF] Nepal

Mr. Namaste Shrestha, Chief of WASH Division, UNICEF Nepal.

At the moment is UNICEF focusing on the implementation of the campaign "Open Defecation Free Nepal – ODF" to assure that children do not only have access to sanitary facilities at school but also at home. The ODF campaign aims at creating awareness about sanitation and hygiene across the country to achieve the MDGs regarding a 100% toilet coverage in Nepal by 2017. The campaign is lead by the Government of Nepal in cooperation and coordination with the UN-HABITAT, INGOs, district groups and community groups. It is a combination of bottom up and top down approaches that emphasize on ownership and alignment. Mr. Shrestha emphasizes that cooperation among WASH actors is of utmost importance, especially when it comes to a nationwide campaign. At the moment UNICEF has no capacity to lead or support a safe water campaign. The priority lies on ODF. (Shrestha, N.L., 2014).

4.5.14 WaterAid

Mr. Sarbagya Shrestha, WaterAid Program Manager (Urban).

WaterAid is working on community levels to assure safe water and sanitation practices.

WaterAid is already cooperating with ENPHO in terms of POU water treatments and its chlorination program. Currently they are using Piyush for emergency relief. In addition the current contract period is still running and it's not possible to contract a new partner. Nevertheless, Mr. Shrestha emphasized that there is an interest to receive a project application

from ECCA in the new contract period to implement its school program. ECCA should keep the possibility of a cooperation with WaterAid in mind. (Shrestha, S., 2014).

4.5.15 World Vision Nepal [WVIN]

Mr. Bimal Ghimire, Design, Monitoring & Evaluation Specialist WVIN

World Vision International Nepal is implementing WASH projects in line with Nepal's Sanitation Master Plan. Its WASH projects aim to provide safe drinking water to communities, promote the use of toilets and raise awareness among communities with regards to good personal hygiene practices.

WVIN is reluctant to discuss the issue of a nationwide campaign and is not interested in supporting WATASOL as specific product. (Gimire, 2014).

4.5.16 Federation of Drinking Water and Sanitation Users Nepal [FEDWASUN]

Mr. Balkrishna Pokhrel, Program Manger FEDWASUN.

FEDWASUN is a grass-roots level umbrella organization for drinking water and sanitation users' committees of Nepal, including more than 4000 users' committees as members. FEDWASUN is supporting these groups with advocacy training and capacity development to implement the water supply schemes on community levels according to the WSP.

Pokhrel identifies several obstacles for water quality in Nepal, among them is the lack of government support for the users' committees, hence operation and maintenance lack and the outcome is unsafe water. At the moment all WASH cluster stakeholders are focusing on the ODF and water quantity and neglect the issue of water quality. Therefore the promotion of HWTS is important. A next step will be to focus on water quality, for setting up a nationwide campaign focusing on safe water patience is needed and the cooperation among all WASH stakeholders pertinent to achieve inclusion and ownership. FEDWASUN will be part of it, but is at the moment not in a position to initiate it. (Pokhrel, B., 2014).

4.5.17 Role of the government

Unfortunately the Government of Nepal refused a meeting. Nevertheless, the role of the government is crucial to reach the BoP. On one hand, a market approach needs to comply with the regulatory framework established by the government to move within the legal boundaries. On the other hand, the government should act as coordinator and facilitator for the implementation of a project. The established governmental bodies in the WASH sector are the VWASHCC (Village WASH Coordination Committee) and the DWASHCC (District WASH Coordination Committee) which coordinate water related projects and initiatives in the respective regions (Panthi, 2014). A close cooperation with these bodies is essential in terms of awareness creation, that none overlapping actions are taken (Blum, 2013).

4.5.18 Summary potential cooperation

The most important insights from interacting with intergovernmental organizations, INGOs and NGOs are that there is a willingness to create awareness among Nepal's population to treat water throughout, but what has to be emphasized is that coordination is essential. The WASH cluster needs to join hands and work together with the government to execute a coordinated and aligned strategy that encompasses not only chlorine as a treatment solution but also other suitable HWTS simultaneously. Hence a nationwide chlorination campaign has to be part of a safe water campaign. Unfortunately is this currently not feasible due to the fact that all major stakeholders are concerned about water quantity and not really focusing on the water quality issue yet. A lot of lobbying will be needed to pressurize stakeholders to focus and pursue a water quality path. Nevertheless opens this situation potential for WATASOL in the near future but implicates to be patient.

For WATASOL itself, it is important to coordinate its activities more concisely with the government bodies such as the VWASHCC and the DWASHCC to coordinate market creation activities better. Nevertheless, some feasible actors have been identified that could be potential customers of WATASOL in the future, such as WHO, Oxfam, WaterAid, MinErgy, NEWAH, UEMS and CRS.

To identify some further market potentials, untapped safe water market segments will be discussed in the following.

4.6 Underserved market segments or future customers?

Several discussions have been held with ECCA and MinErgy staff to explore underserved market segments and to identify future customers and potential market niches for WATASOL. The outcomes are presented below.

4.6.1 Schools

In the Kathmandu valley itself there are 2'000 schools. Mainly private schools are able to purchase bottled water or have treatment systems. The government-run schools, by contrast, are poorly funded and have low water quality and bad hygiene practices. There are more than 400 governmental schools in the Kathmandu valley which need a solution for safe water. (Sharma, 2014). These schools are potential places to replicate and modify the exist-

Figure 15: WATASOL Mural next to a School (Source: Author, 2014)

ing school program of ECCA and incorporate potential to increase the sales of WATASOL among school communities.

4.6.2 Interest Groups

Interest groups are women's groups, children's groups, youth clubs, forest users' groups etc. There are more than 10'000 such groups throughout the country, meeting for various purposes. By approaching these existing structures, an ideal channel for awareness creation and potential customers is given. Once the groups are aware, there is potential for purchases of WATASOL (Shrestha, Prachet, 2014). ECCA, as locally rooted organization, knows best how to approach such groups. To coordinate such approaches and align them with the work of other NGOs, VWASHCCs shall be contacted.

4.6.3 Urban poor and slum communities

The Kathmandu valley is one of the fastest growing urban centers in the South-East Asia (CIA, 2013). People from rural areas are settling down day by day in Nepal's capital, looking for work and a promising future. Various illegal slum settlements have been developed on public ground. These slum communities usually have a central reserve tank for their drinking water, which is either pumped by tankers or coming from the government system.

By creating awareness among this BoP segment, the vulnerability of people can be mitigated and jobs created by diversifying the WATASOL distribution system.

4.6.4 Tankers

As discussed previously, every day a tremendous amount of "drinking" water is sold to households by tankers to match the undersupply of water in the Kathmandu valley. There are around 700 tankers operating in the valley, organized in 3 Associations (Kathmandu, Lalitpur and Bakhtapur). From these 700 companies, roughly 400 are officially registered at the Kathmandu Valley Water Supply Management Board (KVWSMB) (n.d., 2013a, Karna, 2014). Especially during the pre-monsoon months (April till July) the demand for tanker water is really high and sums up to approximately 90 million liters a day in the valley (Giri, 2013). It is a promising business with prices ranging from NPR 600 for 1000l to NPR 2200 for 14'000 l (Shakaya, 2014).

People have to rely on this water source, but don't trust the tanker companies due to questionable water quality (Maharjan, 2014). The observed tanker filling stations use partially rapid biosand-filters, but there is no further practice such as the use of chlorine (liquid or powder) to assure safe water (n.d., 2014). This situation offers a valid opportunity for WATASOL. During the discussions with the tanker association of Lalitpur, the development of a joint venture has been initialized. A pilot project shall be set up to sell WATASOL to the tanker's customers; it is perceived as a service diversification for tankers and implies poten-

tial revenue, if margins are fairly high. ECCA and MinErgy shall set a schedule how to pursue this approach in coordination with Antenna Technologies.

4.6.5 Clandestine jar bottlers

Many water bottling companies are not registered and don't have any quality control (Maskey, 2014); this is reflected in a coliform contamination of 30% in bottled water (Bishankha et al., 2012). By approaching clandestine jar bottlers, scaling opportunities are at hand but there are difficulties in practice. It's a really sensitive issue to talk about unsafe bottled water (Maharjan, 2014). This circumstance has been confirmed, as the chairman of the Nepal Bottled Water Industries Association [NBWI] was reluctant to set up a meeting for a discussion of the issue. Currently jar bottlers can make profits without sound treatment, from a short-term perspective it is not attractive for them to invest in treatment options, hence it will be difficult for WATASOL to be used as treatment option in the future.

4.6.6 Street vendors and side street restaurants

Street vendors and side street restaurants usually rely on jar water. Some just sell tab water or use other water sources without guaranteeing potability. To convince such small businesses, the focus on health and profit can be incentives. An idea is to declare such businesses as "SAFE WATER ZONE(S)" showing that they are selling purified water. Through such an approach, a market can be created and mouth-to-mouth propaganda will spread the recognition of the product.

4.6.7 Summary potential market segments

The discussion shows that various untapped market segments are in place. The insights at hand can be divided into two approaches, reaching people on a collective basis (schools, communities and groups) and on an individual basis (tankers, street vendors and side street restaurants). But not every untapped opportunity is easy to tackle - ECCA's CEO Prachet Shrestha is cautious: "If ECCA is able to approach and reach groups in the future, a big market is created by itself. Then the whole plan of scaling up including a business approach will materialize. **Just going into the open market won't work**" (Prachet K. Shrestha, 2014). Importantly, in order to develop new market segments, awareness creation and scaling of WATASOL as water treatment option have to go in line.

With the gained insights from the market analysis including supply chain, product, competition, market actors and potential market segments a SWOT analysis of ECCA's WATASOL program shall be given to summarize and reflect the challenges at hand.

5 WATASOL's Future Strategy

The SWOT analysis reflects all previous insights gained from the supply chain analysis (chapter 4.3) and the market analysis (chapter 4.4) and serves as basis to propose a future strategy to scale the WATASOL business approach.

Strengths: - School program - Product - Production handling skills - Familiarity and experience with the product - Knowledge of the environment - Diversified distribution strategy	**Weaknesses:** - Shelf-life - Brand is unknown in the market - No promotion activities in the market - Scope of production is limited - Pricing is too low – losses in place at the moment - Pursuit of a business vision/ view to innovate is lacking up to a certain degree → A clear strategy is needed
Opportunities: - "Empty" market → Market potential (groups, communities, schools, tankers) - At scale it can become a self-sustaining model - Certification	**Threats:** - A real market is not created yet – subsidies destroyed it - Focus on water quantity - Increased competition as filter market is also innovating to reach the BoP e.g. Tulip filter - FRC is not tested / guaranteed at HH level - Distribution to rural areas is costly - Investment is needed for promotion// potential for a misled investment - Subsidized competitor Piyush - Promotion is essential (but costly)

Table 6: SWOT Analysis WATASOL Project (Source: Author)

To reach the BoP with WATASOL as a live changing product by pursuing a market approach, the weaknesses and threats have to be addressed and changed by exploring the strengths and meanwhile incorporating the opportunities. The author's recommendations for a new market strategy have to be seen as a starting point for discussions for ECCA and Antenna Technologies newly to be launched activities. Hence the propositions are the following:

5.1 Committed but lacking business perspective

As the analysis showed is ECCA Nepal an experienced NGO with proven knowledge in implementing its school program, raising awareness and producing WATASOL professionally. As an NGO, ECCA is less familiar with developing and executing a market-based approach to scale WATASOL. Currently ECCA is lacking manpower and a business perspective to draft and execute a consistent and feasible strategy to scale up its chlorine production. The idea of moving forward is in people's minds but due to its extensive day-to-day business there is no capacity in place to become innovative and go beyond current patterns. For a new strategy, the position of a business strategist/analyst should be created (with an internal or a new external person) supporting ECCA's WATASOL project. Unless somebody has real capacity to develop, lead, execute and monitor a future strategy, ideas will remain ideas. The question then arises if personality, willingness, skills and capacity of pursuing such a scaling approach are really in place and supported. A feasible solution could otherwise be to cooperate with an existing company, social enterprise, a spin-off or a start up to create an expanded scaling strategy for creating and reaching the chlorine market with innovative ideas and total commitment. Even if such a strategy is pursued, ECCA could remain the reliable producer of WATASOL but would not be responsible for market creation and outreach activities anymore. Finding an entrepreneur might be difficult and possibilities with innovation hubs shall be investigated. In these terms, MinErgy could serve as supportive entity to identify potential partners and donors (institutional and private sector) and to strengthen collaborations with existing partners.

5.2 A good product with potential

The WATA technology is promising and allows the inexpensive production of a highly effective water treatment product. But WATASOL's problems with shelf-life, FRC testing, certification and the production efficiency have to be tackled.

The improvement of shelf-life is pertinent for scaling WATASOL especially to rural areas (Bhatta, 2014; Pandey, 2014). ECCA has to draw from Antenna Technologies' long technical experience or team up with a local university or laboratory to improve the shelf-life consistently. Regarding the certification, several options can be considered such as renting a certified lab, outsourcing of the WATASOL production to a certified laboratory or the professional expansion of the existing laboratory to obtain government certification. To improve production efficiency, the purchase of filling equipment might be necessary in the future. An option to overcome the lack of quality assurance at household level, ECCA could pursue the promotion of FRC testing actively (Ravat-Francoise, 2014).

5.3 Failed market price and wrong product perception

WATASOL as product in Nepal's chlorine market faces various challenges. The chlorine market itself is somewhat destroyed due to the fact that the strategy of ENPHO and PSI, pursuing a subsidized market approach, failed. This strategy entailed the lack of sustainability for a business approach, with market prices lower than production costs. Additionally chlorine did not reach the lowest segment of the BoP towards whom the product is positioned. This mismanagement led to a wrong perception of chlorine as a cheap and not aspirational product. To overcome these obstacles, WATASOL has to be newly positioned. By increasing prices and promoting WATASOL accordingly, it will be considered as an aspirational and life-improving product and will allow attractive margins for distributors as well as money for coherent promotional activities. A pilot project could be set up with a price of at least NPR 30 to see what customers' reactions are and to adjust the price accordingly. A price increase can be a good signal for ENPHO also, although whether WATASOL can leverage the market price with its current market position remains in question.

5.4 Out-of-the-box thinking and new market segments

As ECCA's unique selling point is the implementation of its school programs, schools are going to be an ongoing area of work in the future, where ECCA can apply its profound knowledge and draw from its long-time experiences of reaching pupils and communities.

The interest of the tanker association of Lalitpur has to be discussed and elaborated to carve out a potential pilot project in cooperation with MinErgy. Groups (such as women's groups, forest users' groups, self help groups, bus drivers etc.) incorporate potential, where awareness creation and market creation go in line with each other. Such groups have to be identified and approached. In these terms, ECCA has to draw from its knowledge of the local environment. Another idea in terms of market segmentation could be to set up WATASOL as an inexpensive vegetable disinfectant under a new label and different bottle for a different clientele (for example the expatriate community in Kathmandu).

Summed up, a thorough education campaign has to be launched including social marketing and awareness creation that positions WATASOL as an aspirational product to overcome existing habits. The strategy should be executed in alignment with the Water Safety Plan already in place. In these terms, support might be coming from different NGOs (e.g. NEWAH, UEMS, Oxfam, Helvetas, WHO or UNICEF) and the approval of the government. This potential support has to be investigated further, as it will be the part of a solution to really increase the market penetration.

According to newly materializing market segments a coherent distribution strategy has to be defined also, depending on the decisions based on the strategy ECCA and Antenna Technologies will agree upon. To reach rural areas it is pertinent to increase shelf-life sustainably and create awareness consistently. In combination with this, a twofold strategy with a higher priced WATASOL in urban centers could be launched to cross-subsidize WATASOL sales in rural Nepal at a lower price. Such a strategy would allow fair margins for a viable distribution, which are pertinent. The opportunity to team up with CRS and draw from its profound experience of the BoP market to spread WATASOL throughout the country has to be investigated further.

5.5 Evaluation and summary

Dependent on the strategy ECCA and Antenna Technologies will agree upon, a consistent evaluation framework has to be developed to be able to adjust the implementation and steer the outcome accordingly.

The case study of WATASOL in Nepal has shown that reaching the poor at the BoP with a market-based safe water approach is dependent on various issues. A created market, entrepreneurial initiative and a consistently marketed product are essential, but only part of potential success. The difficult topography in the aid-deprived Nepal, a by subsidies destroyed market, wrong product positioning and prevalent habits and ignorance are only among the many obstacles WATASOL has to face. With a consistent strategy these underlying constraints can be addressed and tackled.

6 Conclusion

The purpose of the thesis at hand was to analyze ECCA's WATASOL program in order to identify potential for scaling the production and sales of chlorine by making recommendations to develop a future strategy for reaching Nepal's BoP with safe water.

The first part of the thesis gave a theoretical overview of the BoP proposition and outlined actual critics. It showed that Prahalad and Hart's appraised BoP approach of including the world's poorest into the formal economy by addressing them as customers and consumers has some limitations. Although there are case studies in place that reflect positive outcomes, criticism has been raised from different disciplines. By overcoming the paradigm of looking at poor as sole consumers, but instead incorporating them as actors within the market, people will have the endowment to create income and be lifted out of poverty in the long run. This thesis then further shows that various public and private sector actors have adopted this perspective and developed different market-based development approaches. Among them two prevalent ones, the M4P and the Value Chain Approach that aim at alleviating poverty through economic growth by adopting a systemic perspective. The most crucial elements of the value chain approach have then been applied to the case study of WATASOL in Nepal.

Nepal, ranging among the poorest countries in the world, is facing major challenges regarding water quality and quantity. The case study demonstrated that only using HWTS and relying on sound water bottling companies guarantees safe drinking water, implying a substantial potential for WATASOL in the market. The thorough investigation of the chlorine market revealed that many obstacles are in place to scale the production and sales of WATASOL. The by subsidies destroyed market, led to a misperception of chlorine as cheap and not aspirational product and does not reach BoP consumers consistently. Facts show that people are, by majority, not aware of the pertinence of water treatment due to prevalent ignorance and habits. ECCA itself is a reliable producer and implementer of its school programs but lacks entrepreneurial initiative and conviction, necessary to tap the market potential in place. The organization faces in addition some problems to assure safe drinking water at the household level and has limited production potential. Additionally, the difficult topography limits market access substantially and leaves in question whether a market approach can ever sustainably work in the rural areas due to high transportation costs. The case study concluded with proposed recommendations for a future strategy to overcome the obstacles at hand to scale WATASOL in Nepal.

It became clear that:

- A thorough awareness campaign paired with conventional marketing means is essential to overcome the obstacles of prevalent habits and misperception of the product and to increase visibility in the market.
- A feasible market prize is higher than the currently established one.
- By cooperating with a local entrepreneur or start-up, the entrepreneurial capacities in need could be established to facilitate the market penetration with local knowledge and an innovative spirit.
- For further market penetration, a pilot project with the tanker association in Lalitpur and a cooperation with interested INGOs shall be considered. Additionally, groups, communities, urban poor and side street restaurants offer potential to further increase market share.
- To overcome the distribution obstacles, a viable strategy has to be developed and a cooperation with CRS taken into consideration. One idea is to set up a twofold strategy with higher priced WATASOL in urban centers to cross-subsidize the lower priced WATASOL in rural Nepal to allow pertinent margins for distributors.
- FRC testing could be actively promoted by ECCA in the future.
- To increase shelf-life, a local university might provide assistance and also Antenna Technologies is in need to provide further technical support.
- The issue of certification can be overcome by renting a certified laboratory, outsourcing the production or establishing a certified laboratory, meanwhile improving the capacity in need for scaling.

To scale WATASOL will be a challenge in the future but with a sophisticated awareness campaign in cooperation with other WASH cluster members, having the shift in paradigm towards water quality in mind; ECCA will have opportunities ahead to enhance its impact and WATASOL's market position continuously to be sustainable in the future.

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Visited Schools

Mount Kailash School - Nature Club. Conducted May 16, 2014, Kapan, Bekh, Kathmandu

Jalpa Secondary School – Nature Club door-to-door activity. Conducted May 17, 2014, Nagdaha, Dhapakel, Lalitpur. (Translated by Rabindra Khatri, ECCA Program Administrator WATASOL)

Lalit Kalyan Kendra Lower Secondary School - Nature Club. Conducted May 23, 2014, Bhola Dhoka, Lalitpur. (Translated by Akriti Manandhar, Intern ECCA)

Shrestha, Ramesh. (2014). Principal and Teacher at Lalit Kalyan Kendra Lower Secondary School. Conducted May 23, Lalitpur, Kathmandu

Kapil Chhetri. (2014). English teacher at Mount Kailash School. Conducted May 16, 2014, Kapan, Bekh, Kathmandu.

Visited Slum

Ms. Sita. (2014). Shopkeeper Bhansighat Slum. Conducted May 19, 2014, (translated by Rabindra Khatri, ECCA Program Administrator WATASOL) Shop, Bhansighat.

Appendix

Appendix 1: Costs of boiling

Mean for cooking	Share of population [%] [1]	Price per unit	Amount needed for boiling 20l of water	Costs [NPR]
Firewood	64	variable[2]	7-10 kg	> 1 hour[3]
LP gas	21	103 NPR/kg [4]	0.1l	13
Cow dung	10	none	-	-
Kerosene	2.5	105 NPR/l [6]	0.14l	14
Biogas	2.4	neglectable	0.13l	
Electricity	0.1	8.05/kWh[5]	1.75 kWh	14.0875

Energy need to boil 20l of water

Energy needed to boil water: E=c *m* (delta)T; c = heat capacity
Cwater = 4200J/kg/degree Celsius
Energy needed to boil 20l of water: E=4200*20*75 = 6.3MJ
(given an average room temperature of 25) [7]

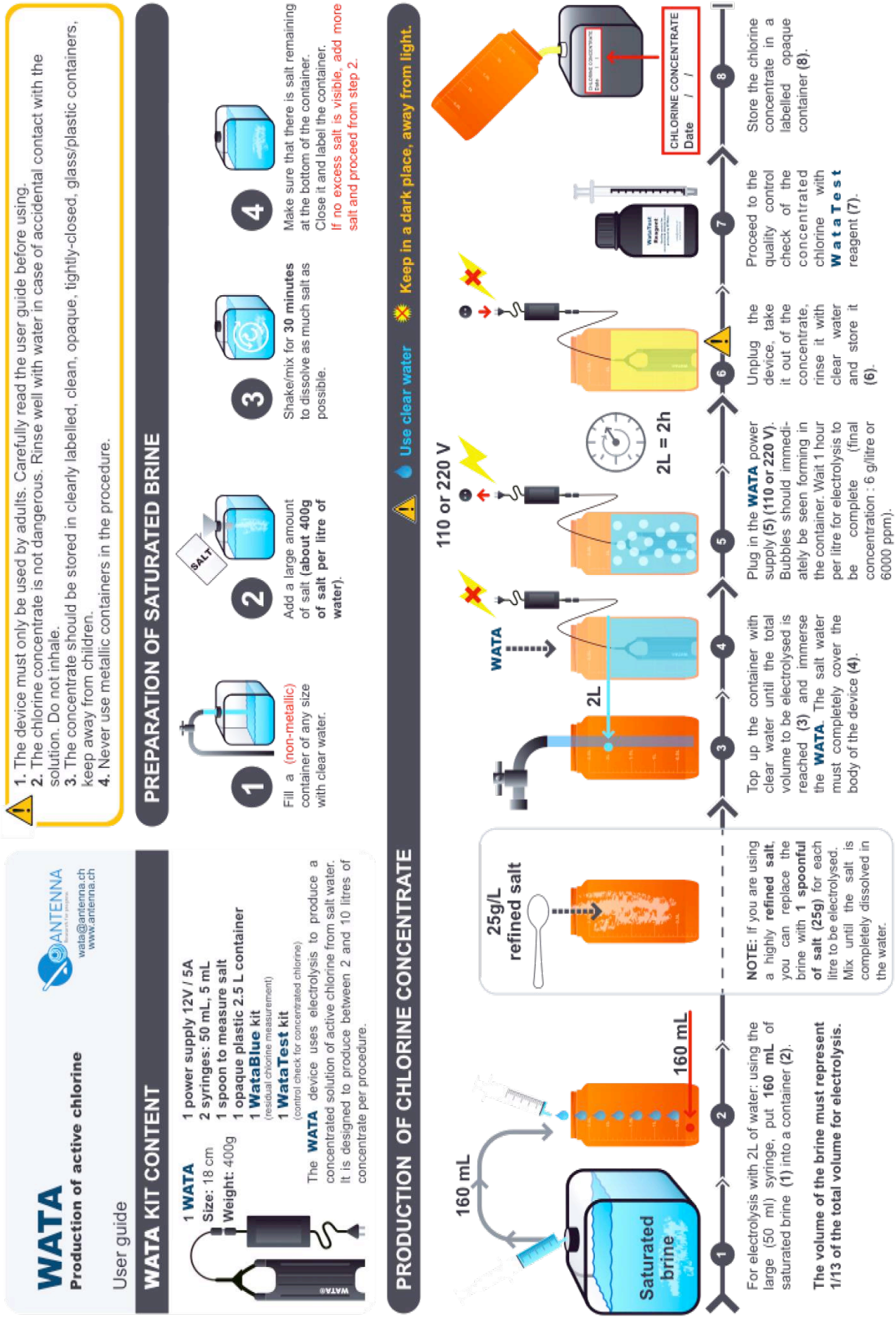
Energy per resource

Resource	Specific energy	kg need per 20l	Price:
LP gas	50MJ/kg [8]	0.126	13.04366197
Kerosene	44.5MJ/kg [9]	0.141573034	14.86516854
		kWH/20l	
Electricity	1kWh=3.6MJ [10]	1.75	14.0875

[1] Dhakal, 2013
[2] Ligtenberg, 2007
[3] ibid.
[4] Nepal Oil Corporation Limited, 2014
[5] Hahn, 2014
[4] Nepal Oil Corporation Limited, 2014
[5] n.d., 2013b
[7] Murphy, 2012
[8] Hahn, 2014;
[9] Caffin, 2011
[10] n.d., 2014b
[9] Caffin, 2011

(Own illustration)

Appendix 2: WATA's mode of operation



(Source: Antenna Technologies, n.d.)

Appendix 3: WATASOL cost calculation

Variable costs

Lab Accessories/Chemicals for 20l WATASOL

Item	Quantity	Rate	Remarks [NPR]
NaOH (Sodium Hydroxide)	25 gr	0.75	18.75
Salt	0.5 kg	16.00	8.00
Mask	2 sets	7.00	14.00
Gloves	2 sets	7.60	15.20
		Total	55.95

Labour/Electricity Cost for 20l WATASOL

Item	Quantity	Rate	Remarks
Electricity	20 hrs.	0.25	5.00
Labour Cost	2 days[1]	700.00	1'400.00
		Total	**1'405.00**

Fixed Costs

Equipment used to produce WATASOL[2]

Item	Quantity	Rate	Remarks
PH Meter	1 pc	3'842.00	3'842.00
Thermometer	1 pc	300.00	300.00
Beaker (50ml)	3 pcs	115.00	345.00
Wash Bottle	1 pc	90.00	90.00
Air Tight Bottle	1 pc	60.00	60.00
Syringe (20ml)	1 pc	25.00	25.00
		Total	**4'662.00**
	Fixed costs per liter[3]		**1.06**

Actual Expenses per 60ml-flask[4]

Costs	Quantity	Rate	Remarks
60ml bottle with cap	1 pcs	7.45	7.45
Sticker for bottle	1 pcs	2.15	2.15
Lab Accessories/Chemicals			0.17
Labour/Electricity Cost per bottle			4.22
Equipment used to produce WATASOL			0.06
	Total costs per 60ml bottle		**14.05**

Actual Expenses per 1l-flask

Costs	Quantity	Rate	Remarks
1l bottle with cap	1 pcs	20.00	20.00
Sticker for bottle	1 pcs	5.00	5.00
Lab Accessories/Chemicals			2.80
Labour/Electricity Cost per bottle			21.88
Equipment used to produce WATASOL			1.06
	Total costs per 1l bottle		50.73

[1] 8 hrs per day used for:
3 hrs stabilization process
2 hrs producing and pH testing
11 hrs to fill, close and label the 60ml-flasks (2min/bottle = 330 btls) (Shrestha, Junu, 2014)

[2] Equipment can be used for approximately 2 years

[3] Produced liter 2013: 2211 --> Approximate production in 2 years: 4400 l

[4] Out of 20l produced Chlorine, 330 60ml-bottles can be filled

(Own illustration)

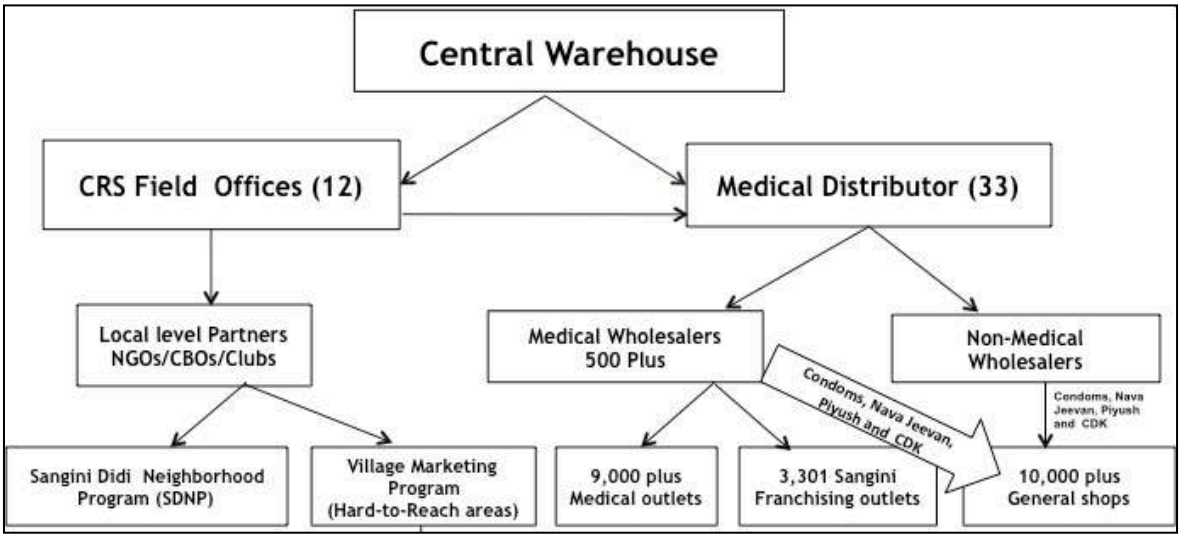
Appendix 4: Market share

Market Share including all liquid chlorine sales:

Product	Item	In liter	Market Share total [%]	Market Share flasks [%]
Piyush 60ml	91706	5502.36		
Piyush plus	24016	4803.2		
	Total	10305.56	80.78559625	90.21031301
WATASOL 60ml	8952	537.12		
WATASOL misc. [l]	1674	1674		
	Total	2211.12	17.3330365	8.805996577
WaterGuard	1000	240	1.881367252	0.983690413
Total Liter of Chlorine		12756.68		
Total small flasks:		101658		

(Own illustration)

Appendix 5: CRS distribution network



(Source: CRS, 2015)

Appendix 6: Interviews

Padmaja Shrestha, Senior Program Manager ENPHO. Conducted May 21, 2014, Office ENPHO Nepal, Kathmandu.

[…]

Interviewer: How is Piyush produced?
Padmaja Shrestha: We dilute chlorine solution, imported from India with DNS water, in the lab. The result is a 5% concentration at a pH of 11.

Is your product certificated?
Piyush is trademarked, the lab is certified and the pharmaceutical lab certifies ENPHO.

What is your USP?
Piyush is a low cost purification treatment compared to other treatments and people can afford it and like it and are assured of the quality.
But we don't have such a commercialized focus, it is somehow promoted by itself, because there is a latent need. Our promotion focuses on awareness, training to our community program, so if they like it they will buy it. We are not only promoting the chlorine, we promote biosand, SODIS, boiling as options or combinations, which are most suitable for people. We don't promote it commercially, because the costs are high and we don't have the money for that. CRS is our distributor and social marketing and the promotion of Piyush. Especially to the medical shops, wholesaler and department stores, groceries. CRS is funded by USAID.

What prices where you selling at? What is your perception of the Willingness to Pay?
20 Rupees

And how about the willingness to pay?
Low price, not really higher

What are your production costs?
We don't really care how much the costs are, because we are not a commercially oriented organization. We don't cover the costs.

But you sell it to CRS at 12 Rupees?
Yes, but we don't know the exact costs.

How much is PIYUSH subsidized then?
It is cross-financed with the profit for water testing and other activities from the lab.

Did you do the FRC test? Or how do you assure that the end-consumer is drinking safe water?
People don't know about the FRC test only about the guidelines. During the training we show the people the FRC test, to show the contamination. We promote Piyush to use in the clear water, no chemicals or iron, only to kill the bacteria and germs and not against turbidity. Use clear drinkable water. With really high contamination is not working.

Like with WATASOL, but ENPHO has been producing Piyush for a couple of years, what is the actual status?
In 2013 we sold 92'000 bottles.

Why did the production, the sales respectively drop?
Piyush is steadily increasing, Sales are low during the winter and high during May-August due to the rain.

What do you know about WaterGuard?
WaterGuard was monitored by ENPHO and we make reports, at the moment there is no production respectively no more WaterGuard in the market. WaterGuard was sold at NPR 35, but it was 240 ml and did high marketing, radio, TV, jingles which was really expensive. WaterGuard has no more funding and is out of the market at the moment.

When we are talking of other products, what do you think is the potential market?
Approximately 200'0000, depending on incidents like epidemics, disasters and so on.

Who is your target group?
Poor people, single customer, urban and little bit rural. Distribution is through CRS focusing on medical shops, pharmaceutical shops, groceries, department stores, trekking tourism but as well local NGOs and INGOs.

How did you try to expand? Are there specific segments? Or have you tried to team up with bottling companies?
People don't like the chlorine taste if they are not used to it, bottling companies are not our target. We focus on people only and some INGOs and the government.

Then social marketing is important for you?
It is really important, ask CRS. We make awareness in communities and have our own program on community level for the 4 treatment options.

What were the means you used? Are using currently?
Ask CRS, they know more exactly.

How could you maintain that customers bought again?
You have to change their habit and really convince that its healthy, after you are able to reach this step, people don't want to drink water anymore without chlorine. You have to convince people that the smell is not harmful and that it helps you and they will continuously use it.

How did you distribute PIYUSH?
Through CRS. For more details, ask CRS.

What were the major issues for the distribution?
Geography and accessibility is a big challenge, especially for rural areas.

Given the accessibility, do you have problems to be present in the market all the time?
Piyush was not available all the time, that's right, because of the distribution problems, we are not focusing and good at the commercial site, we are the technical part and production. Piyush is produced for the need of the people, the good effect and the result.

What are your plans for the future?
We are thinking to trademark our newer product Piyush Plus.

Are your donors still interested in a cooperation with ENPHO? Or did the funding end?
Piyush is not funded by donors, its cross-subsidized with other products and services provided by the ENPHO lab and by itself it is non-profit. We haven't got any funding for the production, but for the marketing. CRS is funded and supported by USAID.

In terms of what is your PIYUSH-program sustainable?
The program itself will not be changed. But we have to do the costing of the Piyush production and we know what the actual costs are then. Then we know if we can increase or decrease the price of the product in the market.

What circumstances should be in place to team up with another organization? Or change the brand?
We don't need support for the production, because we have a well running laboratory that is self sustaining and productive. Of course if there would be funding, we could make a stronger and more efficient production unit with advanced technology. It will be fine but not a necessity. It would be more likely to have investment for the CRS, for the social marketing part, to be able to reach more people.
The product is too strong and too well recognized in the market to exchange it by another brand. Our network is working and we are planning to increase the project, but not under a different brand. Donors would be welcome for the lab, but there is more interest for the social marketing part.
The goal of ENPHO is to spread Piyush nationwide, but it takes time and good ideas for the distribution. One idea is to team up with weiwei. Do you know weiwei?

You mean the noodles?
Yes, they reach everywhere, but so far we lack that and cannot do it so far, there has to be a specific project, that we could team up with this company.

Is there any possibility to cooperate with ECCA?
Funding for the marketing and the production of Piyush would be ok and we would be really happy for that, but not in terms of changing our product.

Besides, what are sources of safe water at the moment in the KTM valley?
You can't say that, there is no safe water, you can not assure it. Even if the government is assuring it. The ground water is not safe to drink without treatment, I think actually every source is contaminated. Some bottled water is ok, and others fulfill only a minimum standard that is not thoroughly recommended to consume.

[…]

Rojita Maharjan, Program Officer Minergy Nepal. Conducted May 19, and May 25, 2014, Minergy Office, Lalitpur, Kathmandu.

[…]

What is the segment MinErgy has activities in terms of safe water?
One of the areas we are working are communities of the urban poor, where there are tanks installed and purified with chlorine (WATASOL). These tanks are managed by entrepreneurs who sell the water to the community each and every day. The water purification uses a combination of biosand filters for the turbidity and chlorine for the bacteria. This is one of the most efficient ways to treat water for huge amounts and bears a huge potential for communities, there are around 40 such communities to be targeted in the KTM valley.
There are different areas where we are trying to promote the chlorine. The people who are approached and see the bad quality of their water are easily convinced that they have to do something and are more likely convinced by WATASOL, even if they don't like the taste.
We are using this small veil [coliform test] that shows the water quality within 40 hrs (if it's bad its color turns into black). It's a really useful tool to convince people because it shows the quality more or less immediately and people have a graspable result at hand. It's a really helpful test that we need often. People who saw their bad quality are buying the chlorine and are continuously doing it. What we are feeling is that people who do continuously buy chlorine is not that high, they are complaining about the taste. This is an issue that we have to put a lot of effort, to keep customers at it and is the most difficult part. People do know that their water needs treatment, but when they smell the chlorine then they feel redundant to use it again, because they say, we have been using this water for years without any treatment, we get a lot of comments like that. That's a really difficult part. Therefore social marketing is really essential and effective as well.

What are other difficulties regarding the promotion of chlorine?
A difficulty while promoting chlorine is that people ask for a quality assurance and the bottle is sometimes leaking, the 1 liter bottle. The small flasks are perfectly sealed, the 1 liter bottles should be produced in the same way and the date is not always stated.

How does your project with the brick kilns look like?
They purchased two Mini-WATA devices, and the issue we are facing is that there is always the question of quality assurance because of the unstabilized chlorine has to be used within 24 hrs. Therefore the devices are underutilized.
They have big reserve tanks and we sell them 1 liter [of chlorine] regularly, we tried to sell the small flasks as well, but it didn't work. With the treated tank, you can assure that all workers do get access to safe water.
The problem as well is that the devices should be charged for 8 hrs, but as you can imagine, that's a major issue in Nepal and depending on the endowment really difficult sometimes. Added on that, that the produced chlorine should be consumed within 24 hrs is difficult.
But where I see potential for the device is for communities with big reserve tanks. There the produced chlorine can be used steadily. We try to train people that they are aware of the quality and do quality testing on a regular basis, because that is really important. Otherwise it will have a negative impact on health, sometimes there might be a high dose of chlorine or there might be a low dose and then it doesn't work either. But the quality check is not possible all the time while doing door-to-door campaigns. By checking the water tank, its very easy and you can assure quality continuously.

Do you use other POUs too?
For the kilns, we have installed biosand filters for 5 kilns, and they treat their tank water additionally with chlorine.
Some people additionally use the clay filter, it got popular because it keeps the water cool. We work with different strategies, based on the circumstances and the degree of water pollution. The goal is to provide people with safe water. For the household level we promote ceramic filter and tulip filters and chlorination for tab water.

When we are talking about water, how does water quality look like in Nepal?
The issue is, that there is a governmental institution which checks the water quality, but still it is an issue, because the water gets contaminated during the supply and distribution process.

Are there places in KTM valley where you can drink tab water without any treatment?
There is no guarantee. Sometimes the water is not even usable for other household purposes like cleaning or laundry because it's really dirty.

Does the government treat the water?
The government uses bleaching powder in a few plants and has two plants with good water treatment technology.

That's what I perceived as well so far, without treatment there is no assured potability. Maybe we could focus now a bit on potential markets. One specific question, that Urs [Heierli] and Fanny [Boulloud] suggested to investigate as well: Have you tried to approach tanker companies already?
We approached one tanker company and they said they are already doing treatment for safe water, mostly bleaching powder, but that's just what they said, they don't use it regularly.
Instead of approaching the water tankers, we are focusing on the end-consumer, to make sure that people do really get safe water. For the tanker you have to assure that they are cleaning their pipes and tanks properly and that's a bit difficult sometimes. But we will try to approach more Some are telling that they are using the bleaching powder, which is cheaper and has the same effect.
Tankers said sometimes that why should we increase our quality, if we can sell it without additional costs? Their main concern is their business, their profit. Our goal is to deliver safe water to the end-consumer, therefore we should link the potential in the safe water market and how they could increase their sales by using our product, that might be one way.
Another idea is, Newar communities, in this valley [Kathmandu valley] are around 40 communities, who have a reserve tank, there is a high potential to do social marketing there and provide people with chlorine.

What do you think about street vendors, like fruit sellers or the lemonade guys?
We do such kind of things: either entrepreneurship model for street vendors or side street restaurants who sell safe water or where people do sell and do also provide delivery service by bicycle to urban poor, shop vendors, side street restaurants, they sell 1 liter for 5 Rupies.
We try to approach the bus driver association. Bus drivers don't earn a lot and can't afford sealed water bottles. They just get water on their journeys wherever they can get – so it's not safe at all. The association is not willing to invest in a safe water provision, because it's not in their responsibility. But they would support social marketing campaigns, if we could provide them with water for affordable prices. What we recognized is that the first step should be to raise the awareness of the bus drivers, now we are thinking to raise their awareness through stickers and flyers, because it's not easily possible to reach all of them at one moment, because of their schedules and roaster.
Another possibility would be to install a reserve tank for them, where they could purchase safe water. But at the moment we don't have enough money to do the first investment of roughly 1'000'000 Rupies, there has to be a funding to do so.
But either way, the first step is awareness raising and is essential. If we could install one tank it would guarantee that every driver will use and get safe water. At the moment they have only access to raw, untreated water. They were approached and used chlorine, but didn't continue. It's not difficult to introduce chlorine, but it's difficult to keep the continuation of the use of chlorine.

How can you increase the continuity?
From the community model we have learnt that it's not necessary to do awareness programs all the time, but at least 3-4 times to assure that people are fully convinced of the use of chlorine or other water treatment options to change their habit. Doing it all the time is too costly and not efficient.

Changing habits is pertinent then?
Yes, really pertinent.

Have you been approaching water bottling companies?
There are only approx 150 char bottling companies certified, they don't need any additional treatment because they are using RO [reverse osmosis], UV [ultra violet] treatment etc. but a lot more is doing business, without any control or legal registration.
We tested water as well and it was not safe. What is the actual trend in the market is that if it's sealed, it's perceived as safe, which is totally wrong. People don't know where the jar bottlers source and how they treat their water. Because there is such a high demand and money to make, companies set up easily and don't invest in proper treatment equipment (RO, UV…). Some just source underground water and seal the jars or lack maintenance of their machines. It's difficult to approach them, because on one hand some are really small and on the other, you don't know if they are using proper treatments or not. And if you tell them that their water is not safe to drink then they sometimes said, how dare you that you accuse us to sell unsafe water. We are not the authorized person to complain about the actual status, it's a really sensitive issue. Some entrepreneurs prefer a UV device (NPR 6'000), because its cheaper than the Mini-WATA (NPR 12'000).

What do you think is the most pertinent to scale chlorine?
I think change the habit and we always have to adapt to the circumstances what combination of products we do offer. Another issue is that compared to Piyush, WATASOL is not that well-known in the market. And we see is the demand is very low during the winter season and peaking during the rainy season.

[…]

Prachet K. Shrestha CEO ECCA and Yogendra Chitrakar, ECCA Board Member and Director. Conducted May 16, 2014, ECCA office, Lalitpur, Kathmandu.

[…]

Interviewer: We have been talking about many issues already, but what I'm still interested in and I don't see through yet is the issue about certification. May we talk about that today? What is the issue with the government?

Yogendra Chitrakar [YC]: The product has won a poverty alleviation award, was shown to the Prime Minister, is recognized and has been replicated in different districts. The thing is the required fund for the investment to set up a lap, maintaining it and promotion, standardization that are needed for the governmental approve. We have to think about that. Because the money we earn from the WATASOL sale is negligible. If we can sale to a higher price, there might be possibilities and use the money to invest, but now, we are earning nothing from it. At the moment we are just promoting the brand of WATASOL and for the last 5 years we have been promoting Antenna's technology and the WATA device, now the third scenario is now the liquid promotion. Now we are in this position and Antenna [Technologies], SDC and ECCA are shooting on these things. If there is potential.

So, only money is an issue?

Prachet K. Shrestha [PS]: Actually there are different factors, you have to study pros and cons of a possible scaling. One aspect is money, but more precisely money for what. Money for certification, investment in a lab and the maintenance of it is big, but what if we do that and there is no market? Use of water purification by chlorination is international practice, its recommended by the WHO, the Government of Nepal it's just a question if WATASOL is up to the standard of chlorine solution requirements of 6 g/l. is it ok to use within one week, or how does it look like? This is the issue of stabilization. Then the question has to be asked, how to stabilize. For all that a proper lab is necessary. If we go to the government and they are coming here, and see this small lab, it's very hard to convince them that we produce chlorine with the required strength, capacity and quality.
In Kathmandu there are many certified labs, water labs, they are certified, they could produce it with a certification, because its produced from a certified lab like Piyush and WaterGuard. And it has to be run by trained staff, with all the required equipment and then the issue comes, that we can produce other chemicals and analyze water and other things. But then we can only produce it from this lab. And you could provide other services for government and other organizations, INGOs, for example water quality testing and not only to produce WATASOL. So they are generating money from other activities from the lab. All these opportunities have to be combined then.

So, to receive certification for WATASOL, the lab where it is produced needs a certification?

PS: Exactly. But if we establish a lab and produce WATASOL only, the question raises if the lab will be self-sustaining – I don't think it would be. To do so, then the sale of WATASOL should be very high.

YC: If we see the cost of the WATA device, its live-cycle, and the sales of WATASOL, I don't think the costs break even.

PS: If lets say we take 30'000 bottles a month, 10 Rupies profit, it makes 300'000 Rupies a month, the rest has to be covered like wages, electricity, lab costs, packing, distribution, chemicals for stabilization. And for our case, for stabilization we buy chemicals, its coming from India and has taxes and tariffs on it and becomes more expensive. And another aspect is, how can it be sustainable, at what price do we have to sell etc., we are a little confused about that.

YC: The social campaigning from Antenna is very good, if it is through the project but then it is subsidized. With that the social campaigning can start and the people in the communities can be reached. But if you want to commercialize it, then you cannot promote it from a centralized place, it's too difficult. That's one of the reasons why we promote the Mini-WATA device, to reach communities in the rural areas. In these areas you could hardly get Piyush at any time, because of the accessibility. That's how the distribution of the WATA devices started, because it's a suitable solution to reach secluded areas and that's the right solution for them when we started to introduce the technology and with that the demand was slowly created and now people are demanding for it, even from the medical shops. Due to this fact we started to think again, how we could reach these communities. At the moment the demand and supply from the other chlorine producer doesn't meet.

PS: The approach we are thinking about right now is to provide the schools with a device and they produce the chlorine for themselves. Now the issue at the schools is actually the local production of WATASOL, with the consumption within one week. Without stabilization, we cannot distribute it there. So stabilization is still only done at the office and then the shelf live is 6 months. Now if we would distribute the stabilized WATASOL to all our 100 schools all over Nepal, that's not practical at all. In Nepal it's very difficult because of the geographical and infrastructural conditions. We were distributing through 2 distributors in the Kathmandu valley, but they couldn't sell everything within 6 months.

They told me that, exactly, maybe with the help of Antenna [Technologies], there might be a possibility to increase the shelf-life, I will ask Fanny [Boulloud]. How do you perceive the issue of FRC, is there really no possibility for improvement?

PS: If we go through the outlets, the medical shops, pharmacies etc., who can assure and takes responsibility that everybody does this test in your house if you sell it and take it home?
Even before we started this project 15 years ago, I used Piyush in my home, but didn't use the FRC test. But unless you don't do this FRC test, nobody can guarantee that he water you are drinking is safe and enough treated. Just by selling WATASOL does not guarantee that the water the end consumer is drinking is free of bacteria and germs. Unless everything is fine, no problem, but if something happens and people get sick, even though they are using the indicated amount of WATASOL, who will take the responsibility?

I mean it can be because of water or because of food, I see this is a big issue and we have to think about it.

PS: So if we sell the chlorine solution in the market everybody can buy it, but will these people be able to test it after the chlorine treatment, if its potable or not? Or can the social mobilizer test each and every household or to ask if the have done the FRC test? I doubt that!
So this quality assurance is a big issue if you go to the free market. Therefore the idea of scaling the school programs would be a good option as well.

***But we could sell the FRC test additionally, it's not too expensive I guess*.**

PS: Maybe, yes, but I don't think people are willing to spend even more money. They really have to be convinced to do that.

[…]

Ahmit Pandey, Senior marketing executive CRS. Conducted May 30, 2014, CRS HQ, Kathmandu.

[…]

Interviewer: Why did the production, the sales respectively drop? ENPHO said that Piyush is steadily increasing.
Pandey: Supply decreased because on one hand ENPHO produced less, there was a limitation in the supply and on the other hand, we did not promote the brand as previously, due to the lack of funding. There was no branding activities, no media presence, just the promotion through the presence of the products in the outlets.
Social Marketing is inherently important and you can see a correlation between the investment for marketing and the sales. Increase in advertisement implies direct increases in the sales.

How does you marketing strategy look like?
Our marketing strategy is basically based on our strength of our distribution system. The CRS company is known for its sophisticated system and its reach and therefore the product accessibility throughout the country. We do promote Piyush with our field officers and talk to the outlets, where it's sold so that people should promote it as well and see what are drawbacks.

What were the means you used? Are using currently?
Recently we have launched jingles at radio stations, we have been airing these jingles at 15 fm stations across the country to create demand throughout the country, hopefully this will help to increase the sales in the rainy season.
Besides, if the supply is not a problem, then we are able to distribute the maximum products needed to areas that need the product. Recently we distributed a big amount of Piyush to the Eastern part of Nepal, where a cholera outbreak took place. Demand decreased, but will always be there, especially during monsoon time and if there are diarrheal pandemics.

How do you distribute?
We have five area offices across the country, that's where we supply all the products first. From there the products are distributed by vehicles, then motorbikes and to the hardly accessible areas we distribute by walk, transporting the products in backpacks. We distribute directly to our NTOs [Non traditional outlets] and on the other hand we have our distributors who are distributing the products to the traditional outlets like medical shops, health posts etc., where we sell the most products. [Details see Appendix 5]

Who is your target group?
We don't have a specific target group, but we mainly focus on the Terai-regions, where there are lots of waterborne diseases, the hilly regions like Jajarkot and so on. So we do target regions, where people do not have access to proper sanitation, means not proper drinking water. So all those people are our target group.
For the distribution part it depends on the possibilities, but we mainly focus on these medical outlets (traditional outlets) others are nontraditional outlets (groceries, department stores etc.) in the rural areas field officers go to really hardly accessible areas and provide the small shops there by foot in the hills.

What do you think is the potential market?
It is depending on the weather and the outbreaks of waterborne diseases, in the rainy season, the demand for the product is always high. It's hard to number a potential market precisely. May to August, the demand is very high, after September the demand drops tremendously. But to come up with a number, I think you can sell up to 600'000 bottles per year, depending on the marketing.

Speaking about marketing, how do you create demand?
If there is more production and more funding for the product, then we do promote it and create demand meanwhile, if we don't have funding, then the product has to promote itself.
To really create demand, communication is essential. Supply part is there, demand has to be created that's very important. I think basically there is a lack of communication for the chlorination product. Still people don't know what this chlorine solution exactly is, nor are they aware of the brand Piyush. If people would be aware of it, I think they will use it more and continuously as well, on a household or a community level. Basically it's all about communication with the audience. Not even in the urban market more than 30 percent of the people do know about Piyush.

So there is a huge potential and a lot of work needed to do. If you communicate to them properly, then there are much more potential customers that might buy and use it.
We as a company for social products are distributing condoms and other contraceptive means, if you think about condoms, 20 years back, it was a taboo to even speak about it. Now, "Dahl" our brand, is used as a name for condoms, not something else. So making people aware of a product is very essential.

How could you maintain that customers bought again?
The problem with all the chlorination products, if it's powder, tablets or the liquid solution is that with it comes the chlorine smell and taste. People have to be convinced that it is essential for their health and if we could add some flavors that would be good as well.

Do you have problems to be present in the market all the time?
There was an issue with the funding, so no more promotion could be done, the supply decreased and there were some issues with the expiry of the product as well.

How are you financed? Or subsidized respectively?
The donors do support us with funding for the promotion activities, outreach activities – we are just responsible as distributor to have the products present in the market.
So ENPHO has contracted us to do the sales, so we are selling the product on behalf of ENPHO.
For the jingles now, we have some budget from USAID, but it will not last and when we are short again with budget, then we cannot promote it anymore.[The jingle was produced by ENPHO, we are paying by our funding for the airing.] The training and social marketing activities are part of ENPHO's work, when we go to schools and inform and promote contraceptive means, we do sometimes talk about Piyush as well, but that's not our main task.

How do the margins look like if I may ask?
- 12 RS from ENPHO
- 14 for distributer
- 15.68 from distributer to wholesaler
- 17 retailer
- MRP 20

There are really small margins, because a good will is in place from the distributer and wholesaler. We have been working together with them for many years and they are willing to sell our product not only for business purposes per se, but as well for the good will.

What is the willingness to pay?
The WTP is not higher than NPR 20, at least in the rural areas people can not afford more or are not willing to.

What are your plans for the future?
More shelf-life for Piyush and the issue of packaging, which was a huge issue before, it was leaking. On the other hand we are thinking about introducing chlorine tablets as well, which are much more expensive on one hand, but on the other hand easy to pack and transport and would target another group of people.

What sort of problems were you facing?
VIREX, a chlorination powder was really popular among hospitals and hotels, but we had a problem with fake products. Therefore we took it from the market, because we could not guarantee that somebody might get sick using a fake product and our reputation would have been down.

And with Piyush?
As mentioned, packaging – there was leakage of the bottles.

Could there be a cooperation in the future?
If there is another product, we might market it as well, unless it fulfills WHO standards.

Do you have other ideas or recommendations?
If you are talking about sustainability and on the other hand reaching the poor in Nepal, that's a myth!! I think it will not be possible, somebody has to fund the access to hilly regions.
Another option to reach people in a bulk would maybe be the newly upcoming apartment buildings, restaurants, hotels…
[…]

Madan Bhatta, Team leader WARM-P, HELVETAS Swiss Intercooperation Nepal. Conducted June 3, 2014, Helvetas HQ, Kathmandu.

[…]

Interviewer: What are pertinent issues regarding chlorine from your point of view?
Bhatta: Stabilization and shelf-live is really important.
Because Piyush is an older product, people, organizations and the government do know it already.
Advertisement is essential. And what is really important, if you do want to set up a business are the margins for the distributers, otherwise nobody can survive. So what is the sales price?

It's actually sold at NPR 20.

And is it sustainable at the moment or just sold because of Piyush?

It is barely sustainable, but adopted the price of Piyush somehow too. What do you think about it?
From my point of view and regarding my experiences, working in the water-sector in Nepal for 10-15 years. You have to consider, that most of the people do live in rural areas, if you see the source of water that they are drinking, your perception will be different.
You have to know, that people in Nepal do have the perception that water is for free, everywhere. And for water, nobody is thinking about an investment (people want to have it for free). That's the reality. In the rural areas, people are used to drink water directly from the water source. If there is contamination, people do not take care of it. They think it is safe, if it looks clean.

I was not aware of that, but what impact does this have on the use of chlorination products?
One issue for the chlorination of water is as well, if they have to invest, I'm talking about rural people, if you introduce them the chlorine and try them to convince to purchase it and use it continuously, I think they are reluctant and will not repurchase it. On the other hand, people sometimes just don't have the money for it they cannot afford it.
A second issue is, that people buy it, use it and then throw it away because they do not like the procedure or perceive no necessity to treat their water.
A third issue is, that people don't use or are reluctant because of the smell and the taste. So people complain that it's very difficult to drink. And that's what discourages the product and makes other treatments more favorable.
Fourth issue: The supply chain, for the Kathmandu valley its easy and possible to supply. If it has to be sold for 25 Rupies. In the valley, then it's not reliable to sell for the same price in the rural areas. The supply chain could be reliable, if there is a margin that opens opportunity for a business. Why should people otherwise invest their time and money, if there is no profit.
As a person from the WASH-sector, I am always advocating for this, but these are the realities that have to be taught about.

Is it safe to drink the water after delivery?
In the KTM valley it is not recommended to drink the water, in the rural areas neither. The water is as well not treated correctly and not tested on a regular basis. Sometimes the water smells really like chlorine and then on other days it's less.

Do you think a nationwide chlorination campaign is a need?
If the project itself has much more scope and visibility, then we can definitely support it. We are promoting these 4 options, boiling, filtration, sodis and chlorination. If the visibility will be increased and is in the market, then we will definitely support the project and the product.

Could you imagine to bring in knowledge of your specific geographical area of work?
From the perspective to support the project, from our studies and experiences so far from our working area, I think it's not likely to support and use chlorine. In the hilly areas, people are used to boil their water.

Because it is cold there?
Exactly, but what we have to insure is that they are boiling their water all the time.
Regarding support, we will discuss that with our staff and have some assessment later, but I think it will not be feasible for use in our context.
In rural areas, the chlorine is mainly used for emergency purposes and not as a steady treatment option. Sometimes there are funded projects that buy and distribute chlorine for free during the monsoon, but then people use some or throw it away later because they don't like it.

Could you imagine to support WATASOL in terms of purchasing the product?
I think the acceptance of the product will be much higher in the urban area.
For the rural area, the shelf-live would be an issue as well. But competition would be nice and good for the market, so that not only Piyush would be available.
For the future, we can imagine to use the product if it's available in the area of our work for the demonstration – but we can not invest into promotion at the moment. We do not do that with Piyush at the moment either.

Or support marketing, advertisement financially?
Financial support is difficult because we are working in the rural area and I think the response there is much lower than in the urban area, unless there is an emergency. In the rural area, there has to be support from projects, and there might be a two strategy: A bit subsidized for the rural area or during emergencies, and for the urban area as business.

[…]

I think that's it, thank you for your time and really interesting insights.
You are welcome, and if you have further questions, you can contact me on my number, I will be in the field again.

Thank you, I will.

Santosh Basnet, Manager Technical Division and Ratan Budhathoki – Knowledge Management and Advocacy Manager, NEWAH. Conducted June 6, 2014, Newah HQ, Kathmandu.

[…]

Interviewer: WaterAid recommended me to contact you as NEWAH is one of their implementation partners. It would be interesting if you could sketch your activities somehow.
Basnet: In 1992 NEWAH has been established, WaterAid was one of the starting donor's and still is an important supporter and donor. We are an organization working in the wash sector. Our main focus lies in the service provision of the WASH-Segment. We were already active in 80-100 districts. Now actually we are working in 10 districts. We are really concerned about a water quality and water access for people on a community level. We are also working on a water safety plan like Helvetas or ENPHO for instance. We are using water field-testing kits to test the water in the field.
In certain cases we are using chlorination powder to treat the source and during the rainy season we do recommend liquid chlorine as well. The main problem we are facing with the water quality is, that there is biological contamination, arsenic contamination, high iron and loam, that is blocking the pipes.

Budhathoki: In field visits and project launching, we are testing the water sources with field testing kits, if there is contamination and parameters that do need further testing, we bring water samples to the valley to get it tested properly by ENPHO.
The Government has 4 types of labs in Nepal as well, in 4 different regions, in Pilarnagar is one, then Central, Eastern and Western region as well. One of the issues is, that if people want to test their water, there are almost no options to do so. So water testing facilities are not on a good level or easy accessible either. The main issue of contamination people are facing is the biological contamination. During the dry and rainy season, the chance for outbreaks of waterborne diseases is very high.

Could you explain me a bit more precisely how your projects look like, what are you doing, what are your experiences?

Basnet: In the first place we are doing preventive measures to see where is need.
Then after evaluating, we do mostly water supply system construction for example dwell constructions in the plain areas and in the hilly areas rainwater harvesting constructions. So the first part is construction, then the second step is to raise awareness how to protect the water source from contamination, how to use and clean their vessels, how to pursue hygiene on the household levels. This includes the introduction and education for the treatment options like boiling, SODIS, chlorination and filtration (ceramic, tulip…) is provided to them.
In the rural and remote areas, due to the lack of access to the market or due to high prices, people mostly prefer boiling, because they do have access to firewood and they usually have fireplaces. The availability of chlorine is usually very low in remote areas. SODIS is not very much appreciated by people, because they don't believe in the effect of it. For filters, people do have to go to the market have to pay a lot of money, if something is broken again and again, and it always takes a long time to get there and is not accessible in all everywhere.
Therefore we teach the people how to protect their sources and to look after their reserver tanks and give them education how to handle the water safely.

But do you use or provide people with chlorination products?

Basnet: If there is a problem with water quality after testing and we see that there is a coliform contamination, we provide the people with liquid chlorine or chlorination powder for free. When the project staffs are there, they provide the products and recommend them to purchase it afterwards by themselves in the market like in Pokhara or somewhere. Which is sometimes not guaranteed, due to the lack of access. Therefore we and the people in the remote areas do definitely face these problems of accessibility and that is a huge issue. It is the right time to launch such an initiative but I am not sure if it will work out in terms of a sustainable business idea.

Budhathoki: I have to become a bit more explicit. We don't have our own lap or product we are using or promoting, we are a service organization that is providing people access to water in the really remote areas of Nepal, we are working together with the poorest of the poor which do lack access to markets. We are using products from the market like Piyush or whatever, but we have to comply with the government's water quality protocol, to use the product with the right dose and the right time. And it is mandatory for every organization that is working in the water supply sector to do so. They have also to communicate it to their focus group, they are working together with, e.g. community groups to

use products like chlorine and there is a scope and a demand as you see that ENPHO is there and some other suppliers for chlorination powder like PSI with WaterGuard.

But now PSI does not do that anymore.
Budhathoki: Ok, if that's the situation then, there is a scope, as we see Piyush is available around the country in bigger communities. But if you go to rural and remote areas, no products are available, it is too hard to get it there.

Do you buy Piyush then and distribute it among your project area?
Budhathoki: Piyush is good for the household level, but if you have community projects, then bleaching powder is much easier to handle and cheaper as well. If there is an outbreak of diarrhea then we immediately advice people to use it [Piyush] and provide people with it as well. But as we work on a bigger scale, pursuing the water safety plan and provide people with access to water in the hilly areas, where we construct big systems, 30-40 tabs throughout the community with pipes that are 3000-5000 meters long sourcing spring water in the hilly areas.

Basnet: We don't use a treatment plant in our system, because the water we are sourcing in the rural areas is mainly safe to drink if you do treat the source properly.
In the rural areas, there are treatments used, like sedimentation plants or bleaching powder for the reserver tanks. Sometimes we buy chlorine solution in liters, but only rarely.

Budhathoki: At the moment we are more focusing on preventive measures and do create awareness. Our hygiene team gives education for people to use different treatment options, and training on hygiene in all the project area. Fundamentally, washing your hands with soap, cleaning your water vessels and things like that. The main issues in our target regions are during the monsoon, when the water is getting contaminated through floods. And then we can distribute chlorination products.

Basnet: Mainly you can say two things, our projects have two options, one is making the whole system safe, from the source to the tab and the second is also household treatment.

Exactly.

Basnet: At the moment we do not provide them with chlorine for free unless there is a big catastrophe or flood, things like that.

Budhathoki: Maybe to complement somehow. Our running projects are constructing 500-600 tabs every year and providing thousands of people access to safe water. We made a project impact study that showed, that the waterborne diseases vanish up to almost 100% after our project implementation. That show as well the interviews from the public health posts, that stated that they didn't sell diarrheal medicines anymore. So there is really improvement of hygiene practices.

Wow, that's impressive, so nobody had problems anymore?

Budhathoki: Exactly, nobody had problems anymore, so there is impact of our projects but you can never say that there is 100% safety, especially during rainy season. Therefore in terms of a collaboration, NEWAH is not in a position to support the project at this stage with funding for marketing or advertisement and such kind of things. But if it will be started as a nationwide campaign, not only initiated by Antenna/ECCA but as well in collaboration with the Government of Nepal, then the government will involve all the WASH-Sector stakeholders - it will be essential to involve every stakeholder and development partner like UNICEF, the World Bank etc. this platform will be essential to deal with the water quality issue as a primary issue. Another issue will be functionality of the whole initiative.
So if there is a nationwide campaign we ultimately have to contribute and join with our knowledge and wherever we are working. In those areas, we will be working together with the local bodies of the government and networks as well.
What could be done is that we should be careful about water quality and everybody should use safe water. So prevention, water quality testing (labs have to be available) and finding the right treatment solution that can be used, depending on people's affordability, accessibility and acceptance of the options at hand) to assure people to have safe water could be the practical steps of a campaign.
If a nationwide campaign goes on, NEWAH will be ultimately part off. But at the moment, we haven't been thinking to be part as initiator in terms of marketing or financial contributions.
If it will take place, NEWAH as one of the key stakeholders will be part of the campaign. We will be part of it if it's under national guidelines and the umbrella of the government.

Yes, I think for such a campaign, the government is pertinent to be part f it.

Budhathoki: NEWAH as key stakeholder in the WASH-sector will be mandatory to be part of it, no question.

Basnet: One of the major issues will be how to set up a sustainable business to spread the chlorine nationwide. You have to think about the semi-urban, rural and remote areas, how to reach them, the urban area is not an issue for the distribution of a product. In the city area, things are there for water treatment, in the other parts, there is still a huge lack and no availability. I think firstly he market creation part will be really challenging as well as the supply part. As we see the present situation, ENPHO with Piyush is in the market, so there is scope. If there is the possibility to create a demand in the society on the local level and if there is a sustainable supply chain in place, then it can work. But then we have to ask the question as well if the people are ready to buy it –then will you be really ready to supply it? So the success depends as well on how many distributors are in place to serve the market throughout the country.

In terms of feasibility, what do you think about the willingness to pay, are people willing to spend their money, and if how much?

Budhathoki: I think people usually do not treat their water due to the lack of money, but due to the lack of access that people do not use the chlorination products. For example in Jasarkurt we have installed a community model, where we dug a dwell and from there people have to pay a regular fee for the use of safe water and they are more than willing to do. Another issue is that people sometimes prefer boiling, or just don't have the option and knowledge to buy filters or something like that. The main issue here is, that at the moment there is only focus water quantity. People at the moment don't ask for a better water quality, but for a higher quantity. Firstly people need to have access to water and meanwhile we can aware and train them how to have safe water. I think for chlorine, if there will be a nationwide campaign, the demand will increase. In these terms I'm thinking the arsenic mitigation campaign in Nepal at that time every person went to their dwells and tested if there is an arsenic contamination or not.
Through this campaign the interest in drinking water was increased rapidly. So if that could be created with a nationwide chlorination campaign there would be a big potential.

Basnet: I think if there is a campaign, the private sector will try to reach people more. But creating demand is important.

Yeah, creating demand is essential. And what I heard from ENPHO and CRS is, that promotion funding is pertinent to maintain the demand in place. Therefore especially in an initial phase of trying to reach remote areas, a nationwide campaign with ongoing awareness creation and product promotion will be essential. Maybe in the long run, this promotion will not be that pertinent anymore, but definitely at the beginning.

Budhathoki: Exactly, once the product is known to everyone, it will be asked, where can I get it.

Basnet: And distribution is an issue, but if you compare with weiwei, the instant noodles, they are everywhere and have the same price like the chlorine solution. So on one hand, people do have money disposable and on the other hand, distribution is possible. You should think about how they make it work. They sell the noodles as healthy and life-improving product, if you can make that with chlorine too – and it's more or less at the same price, it will work maybe.

[…]

Thanks a million for this interesting discussion and insights you shared with me, have a good time and we will stay in contact.

Biju Dangol, Program officer OXFAM. Conducted June 12, 2014, OXFAM HQ, Kathmandu.

[…]

Interviewer: Where is safe water coming from?
Dangol: If we are talking about safe drinking water in Nepal, the water is not safe for drinking. Because we have to ensure whether the water is safe for drinking when it comes to the tap. Even if the water is treated at a central level, in the treatment plants of the government [usually with chlorination powder], when it comes to the household level, it gets contaminated. The reason why are several factors:
- The water pipelines and the sewerage pipelines are very close to each other so it gets contaminated. Therefore we have to educate and make awareness to the people that they should treat their water with household treatment methods such as boiling, filtration, SODIS or chlorination.
- Water that is pumped is not well treated.

Where is Oxfam working or what are your projects?
Oxfam is especially focusing on the emergency context. During normal situations we deliver awareness education to the people informing them about the 4 different household treatment options to leave the choice up to them. During emergencies we rely on chlorination products, that is the safest method during that time. During our projects we do stockpile hygiene kits that include chlorine – actually we are promoting or using Piyush. In the project areas, a certain amount of Piyush is stockpiled by our implementing partner to react immediately during emergency situations. Usually we are cooperating with UNICEF during emergency situations, which is funding us for these projects.

Is it distributed for free then?
Piyush is delivered for free to the affected communities during emergencies.

How do you perceive the situation of safe water in the rural areas specifically?
In the rural areas most of the people drink the water directly. People believe that the water is very safe. So it's more difficult to convince the people that they should treat their water. But if you are able to convince the people in the rural areas and you have a good supply chain of the products, it would be easier. If you are promoting a specific product like SODIS or chlorine you should focus on the supply chain – its important for SODIS that you have access to plastic bottles, so that people can use it regularly. And for chlorination also, you should have a good market system. So we need awareness on one level so that people will go to the market and buy the product. So awareness and marketing should be linked with each other. But accessibility is a big issue. In the rural areas it is still difficult to convince the people. But there is gradually an improvement that they should drink safe water. Especially during the monsoon season people are more convinced to drink treated water. And as well the government, there are different water supply division offices, on the central level there is the department of water supply and sewerage. They also stockpile the Piyush and other water treatment options and distribute it for free during emergency situations.

Where do the people in rural areas get their water from?
In rural areas people do usually get their water from spring sources and sometimes dwells.

What are your experiences with the use of chlorine?
A lot of complaints are coming from people about the smell and the taste of water not only for the solution, but as well for Aquatab. People were reluctant to use it, so it's difficult to convince them to use the chlorine constantly and for example in the urban area people don't like to drink chlorinated water. But during emergencies, we have to train people regarding the chlorination. Recently we were implementing the program for earthquake preparedness in urban areas where we are training 60 schools in Lalitpur and Kirtipur for mass chlorination. So the people at school do know how to produce and treat water with chlorine in cases of earthquakes.

With what sort of equipment would you do that?
With bleaching powder. We do not have sophisticated technologies, we use what is available in the market. And it is easier for the training to train volunteers at the community level for the wash task group. So we don't provide training for all the community people, only to the task group. Our plan is to mobilize this group during an emergency.

How do you cooperate with the government?
Not only in cases of earthquake emergencies, we haven't faced such a situation luckily so far. We do cooperate with the government during small epidemics like in Jajarkort. During such situations we work together with the government as well as all the local stakeholders in order to promote the different household water treatment options. We work with these bodies not only during emergencies because we have to be in line with their action plan.

What sort of chlorination products do you use?
Piyush and bleaching powder. We are planning to do long-term standby agreements with vendors. Previously we were stockpiling it but there is the issue with the expiring date.

Have you been facing supplying problems with Piyush?
No, we haven't heard of that, but what I know is that during the emergency in Jajarkort, volunteers were trained by ENPHO to produce Piyush in the area of emergency.

Do you think chlorination products will play a major role in terms of water treatment in the future?
I think you always have to give the people the choice how they want to treat their water. If you give them just chlorine, people will not drink it. Another issue is, that we have to focus on the supply chain mechanisms as well. And we have to coordinate the awareness programs with different institutions and the government, e.g. work together with the department for education, PoU water treatment could be part of the children's curriculum and create even more awareness. For sure is that chlorine solution is safe if people handle it right.

How do you perceive the cooperation between the government, (I)NGOs, and multilateral institutions in terms of WASH in Nepal?
At the moment there is the ODF going on, where stakeholders do gather on a platform regularly to discuss and coordinate the issues at hand – covering the five-F-diagram. Faecal-oral contamination can happen through: 1. Food, 2. Fingers, 3. Flies (and all kind of insects), 4. Fields (agriculture field), 5. Fluids [e.g. water]. In these terms water is an issue, but not the major focus. Now the target is on toilets, in the future it might be broadened and focus more on water too, because I think this has to go together.

What are the major problems that have to be tackled in the future?
Water supply in the KTM valley is very limited. At the moment it is very difficult to get water for some people. If the private sector would distribute safe water, that would be really good for the people.

Do tankers really treat their water?
Some tankers use sedimentation tanks and aeration. Few do chlorinate the water before supplying. Another issue is that a few treatment plants of the government do use bleaching powder in their plants. Sometimes it might be that the water that is coming from the tap might be safe to drink in this case people should be able to make an FRC test, not to treat their water again. But this test is not well-known among people.

[…].

Namaste Lal Shrestha, Chief WASH division UNICEF Nepal. Conducted June 16, 2014, UNICEF HQ, Lalitpur, Kathmandu.

[…]

Interviewer: What are the programs you are working on in the area of WASH? And how did it develop?
Shrestha: 40 years back UNICEF started the WASH segment, back then there was a highly focus on water supply. UNICEF developed the gravity flow scheme and others, therefore UNICEF was highly well-known as institution, improving the water supply in Nepal.
Later on we were starting to focus on sanitation as well. In 1980 the start of WASH started after the Un declaration. We realized that water supply and sanitation have to go hand in hand. There were several reasons, one was that there was and still is a huge gap in access. We realized that it is really important to focus on sanitation as well.
But then we launched the sanitation pact in 1994, with the support of the government as a sanitation policy, which was really important for Nepal. Then the government launched the nation sanitation steering committees, to bring together all INGOs, NGOs and stakeholders to work together and gather on the same place. Accordingly the WASH district office initiated from the DWSS to work on capacity building for water and sanitation on the district levels. This started in 1998.
In 1999 we initiated a basic sanitation package, because water and sanitation has to go together and we developed some indicators to improve the situation. But still it was a big challenge for us to focus more on sanitation, because all major stakeholders were focusing on water supply, water supply only. The status was really poor in the 1990, only around 6% of the people had access to a toilet. We realized that something had to be done. With the support of the government we started a so-called national sanitation week in 2000. And in the same year we started the school sanitation and hygiene school program. We thought that is the best way to promote sanitation in a collaborative way. We were especially focusing on the advocacy part, where children learnt and then could spread their knowledge at home. The government, with its department of education they realized the importance of wash facilities at schools, that's why the input of the government is very high to construct toilets all over the country. We now have to focus on the "software component" the awareness and education, because just to have the infrastructure does not change much yet. The knowledge how to use, maintain and clean the toilets is very, very important as well. So we initiated the school-led total sanitation campaign, this initiative helped a lot to declare the ODF [Open-Defecation-Free]. Because it started to declare ODF at schools, then we realized, only schools does not help, children have to have access to toilets at home as well. So it worked from the VDC (village development committee) to the DDC (district development committee) and then to a nationwide campaign. The DDC declares now ODF in the VDC's.
On the other hand, the water supply part, is much more complicated, because there are so many governmental institutions involved like the DWSS, WB, ADB, JICA etc. there is still a lot to do. One of the problems is, urbanization rate of the KTM valley is high, water is scarce. Another is that there were a lot of projects 20-30 years back, which now do require maintenance and repair work.

In these terms, what do you think is important at the moment?
To focus on water and sanitation is high because of three reasons:
- 2008 was the international year of sanitation declared by the UN
- 2-3 years South-Asian sanitation conference
- Sanitation and hygiene master plan, it's best document on WASH in Nepal. It was launched in 2011.

Because of this plan, everybody tries to focus on sanitation, sanitation for all – all for sanitation. It works well from top-down and bottom-up. But the main body to steer these activities is the D-WASH-CC. Due to this set up and responsibility we can implement the Masterplan really fast. Beside there are conferences organized for people to share and learn:
- necosan (Nepal conference for sanitation)
- recosan (Regional sanitation conference)
- decosan (District sanitation conference) which helps as well to declare ODF.

How do you perceive the water quality in Nepal?
In terms of the water supply, that's another issue. There is already some places with a very high coverage on the other hand there is a lot to do, from minor to major repairs, increase the access etc. There are many projects going on from INGOs and the government. So the coverage of improved access to water is very high, on the other hand, the water quality part is very very weak. There are the issues of arsenic, iron, biological contamination. There was the national arsenic initiative where we tested all household pumps and dwells in the affected districts and UNICEF did some mitigation for that as well. In terms of biological contamination we are focusing on:

- chlorination, with Piyush and Aquatap for household level and chlorination powder for reserve tanks.
- filtration
- boiling
- SODIS

But still if you are going to the villages, rural areas, people do drink directly from their source, they do not care. That's why there is epidemics form time to time, especially during the monsoon season.

Do you provide people with products?

Only during floods and emergencies, we do provide people free of cost with chlorination products. During these times, money doesn't matter, just lives do count, so we do provide hygiene kits during emergencies. But when we do work in the field people do have to purchase everything, we do not distribute products free of cost, we don't give subsidies.

If there are issues with people who are not capable pay for something, we leave it up to the VDC, because they know who is in need and they know who will be able to help within their community.

How do you see in these terms the cooperation of the different stakeholders, is there real ownership, responsibility and alignment?

All for water - water for all, that's what we are trying to reach. But it's not easy. The question is how we can reach the MDGS until 2015 regarding water supply and sanitation. We are not only saying private households, we are saying schools and public institutions so this is a big challenge for us. But we hope we can manage it. And we don't say the government has to do everything nor the donors, we have to do it together and work together, so media is involved, women's groups are involved, children are involved, community people are involved. What is exemplary in Nepal is, the government is leading, donors are supporting and the community is taking ownership and is implementing the projects in the districts. The community people do implement the program, it's not a government's or donor's program, it's their program. That's what changed a lot compared to the past where we were used to say, that's a UNICEF program etc. Now, this are community programs or school programs, which are supported by the government – so there is top down and bottom up integrated. The government has to support and develop policy development guidelines and the community people have to take ownership; INGOs, NGOs do support the projects.

In terms of the water supply, it's not possible to construct by people, it's a technical issue. That's a reason why we are supporting these projects with subsidies, people can not do it by themselves. In some places communities then charge for water, in other places it's for free, that depends on the communities itself. Because the user's groups do have to maintain and clean the facilities to assure that the water supply and quality can be maintained. There is still a big issue with water and OD, but now we are working on it and trying to change the habit of the people as a social norm. You have to be innovative to secure and reach people to change their habits.

What is really important to see, that the project set-ups that have been pursued in the last decades is wiped out. Now we are not going from village to village, but we are working through the district levels, meeting the D-WASH-CC, coordinate with all stakeholders including the VDCs etc.. This is the new approach that we are doing in order to circumvent duplications and projects that don't have ownership. So everybody can give inputs, but we have to work together and coordinate, that's the concept we are doing. We are doing that in sanitation and are trying to do it for water supply and quality is another part. In the future we are trying to do more. At the moment there is the ODF and then water supply and then water quality. It does not mean we can't work on supply or quality, but that are the actual priorities and one thing will follow another. The water supply is increasing, but still the water quality is a really weak point it is not focused on that much.

Will there be a campaign on safe water, water quality in the future?

We have to focus on that more but at the moment there is a priority on water supply and the ODF. If you are focusing on different things, then it wont happen anything. And to make clear, still water supply (85%) and sanitation (62%), there is a big gap to total coverage. So I think we should first focus on that and then move to another one.

So you won't focus on quality now?

Of course we have to focus on the quality part as well, because otherwise people will die every day. One day there will be a social movement for water quality as it is now for sanitation.

At the moment each district has to develop its WASH-strategy plan that will cover a lot of things, quality, emergency, sanitation and hygiene. In some districts the D-WASH-CCs have already started. In some districts they are doing only sanitation, others are further and do water supply, it is their way of doing as per their interest and possibilities. And then everyone who is working in these districts do have to comply with the strategy plan then.

The activities are coordinated and a specific modality is implemented and pursued then, like with subsidies or without or whatever. And then there are checks and balances done by the D-WASH-CC. In terms of sanitation we have seen so many organizations who gave for example NPR 25'000 for the construction of a toilet, then its constructed, but the people don't use it, because there is no ownership in place. If you do so, which has been done for the last 35 years, you spoil the whole society. For the nationwide coverage, subsidies are not possible, because we don't have the money. Secondly, some people are capable to do so and third, for people in communities, there are people who can help each other monetarily.

Do you use chlorine in your projects?
During emergencies yes, we provide people with chlorine for free or subsidized– mainly Piyush or bleaching powder.

Do you provide people with chlorine free of cost?
During projects in the field nothing is for free or subsidized anymore. The issue with subsidies is, if you provide people with something, then they are always asking for more and that cannot work at all. For example, nutrition, food free of cost, then containers are asked and then even fuel to cook. So in emergencies, there you have to help without any question, but if people are capable to afford something, then there should be support, but it's not from top down, but people have to help themselves, there are generous people and approaches which are sustainable in terms of microfinance etc.

How are people convinced to do something – what sort of means do you use to convince people to change their behavior?
You have to trigger them in different ways. Therefore you have to set up triggering factors, use whatever tool is useful. One example for positive triggering tools we used for the ODF:
The triple T we used, l works like, you have a telephone, a television but no toilet?
You need a positive dialogue to set social norms.

Do you have an idea for triggering of safe water?
Let me think, somehow safe water should be a prestige you could compare the costs for TV and mobile phones, therefore 20 Rupies for 400l of safe water would be really cheap.
[…]

Prachet K. Shrestha CEO ECCA and Yogendra Chitrakar, ECCA Board Member and Director. Conducted on June 20, 2014, ECCA office, Lalitpur, Kathmandu.

[…]

Interviewer: We have already been talking about the perception of people, may we discuss that today again a bit more in depth?

Prachet Shrestha [PS]: You should mention that, the perception of the people, awareness creation is pertinent and inherently important. A lot of people think their water is safe to drink, they don't see an actual need for treatment.
Need has to be created: everything leads to this point. Social promotion is essential and the product should not be subsidized. If people feel the need they will pay. But therefore social promotion is essential and has somehow to be paid for.

In these terms there is still a lot to do then.

PS: And just two days ago, there was an advertisement from the health ministry, on the national TV channel, stating that you should use safe drinking water, showing SODIS, chlorination, filtration and boiling. So that's a positive point from the government. Especially in this time, when the rain comes, there will be an epidemic in one place or the other, so maybe that's why they did that.
Another issue: You are focusing on chlorination, should it be chlorination campaign or safe drinking water campaign?
I think you have been focusing now too much on the issue of chlorination only and should broaden your view a bit.

Firstly I was only focusing on a chlorination campaign. But now I realized that it has to be a more holistic approach, including especially the government and all the other WASH cluster actors.

PS: Just the focus on chlorination and a single product will not attract that much water donors.
Before we started the WATA program – we were focusing on a holistic approach – but then with the WATA it shifted a bit towards chlorination only due to Antenna.

That's what I realized too. We have to divide between the campaign and the work ECCA is doing. It should be a holistic approach including the government and all the stakeholders. For the future there has to be a strategic focus that is more holistic again, the WATASOL scaling could be included in a safe water campaign. What do you do in these terms already?

PS: Tulip filter is one of the products we do have on our own. There are the other treatment options we do promote as well. In case of the product, we do provide some subsidies. For the other products (biosand filter or ceramic filter) we do refer to local producers, for example in Bhaktapur area. They are sometimes as well subsidized by INGOs like arsenic filters or silver colloidal filters, like we are subsidized by Antenna somehow.
The arsenic filter is mainly used in the Terai region. Aeration is against iron and ammonia and mainly used for ground water.
Another point I had is about the tanker and water business, you have to think about that, why should a tanker use chlorine? If the buyer does not care about it, there will be no demand. Unless there is no demand, they will not change anything. It's extra work and nobody might pay a higher price, because people do not trust those tankers anymore. There were too many newspaper articles about it. It implies extra work for them as well, they have to pour it and maintain the tanker and it's mainly metal, that will not work out. If the buyer wants chlorinated water, they either buy chlorine on his or her own or treat it differently. But people don't trust and depend on tankers. Therefore they will rather depend on HWTS and not trust the tankers to have chlorinated the water.

They are definitely not gonna chlorinate their water, but what might be feasible could be, to start a joint venture selling chlorine bottles to their customers but that they will not pre-chlorinate their water. I guess that will be a good opportunity.

PS: Yes that might be an option, that they buy the water and chlorine separately.
That is similar to what is done in the slum areas with their users committee and their reserve tank. The water quality, treatment is part of the users' responsibility. Therefore if we can reach and make the varieties of groups aware and conscious of safe water consumption, the group itself will be willing to improve their health situation. There are a lot of such closed community groups, which are conscious about their health, we should create and mobilize such groups, it could be women's group, children's group, youth clubs, forest users' groups. If there are 5'000, 10'000 such groups, then the whole plan and business model will materialize. Just in the open market, it won't.
For the shops – there is no visibility at the moment advertisement is needed. The good thing with these user groups is, that they promote themselves and the problem is solved. Once those groups are aware, they will pressurize the local government as well. And from this point there will be pressure towards the district and the national level.

Talking about these different levels, what I was always interested in, is how are projects identified and executed, for example schools or community groups to use the WATA or chlorine directly? Is it more a top-down approach or are consumers directly approached?

PS: At the beginning, ECCA approached schools but with the time, people are aware of what we are doing and approach us, the information has been spread mouth by mouth. There is another approach, for example a teacher's workshop, schools do get interested and approach us. In case of the government, there are workshops organized and do share and present there, so there is coordination and networking.
To implement our programs, we don't depend on the government, they are too slow – we can't wait for two to three years. Grass root development does not work together with the government. There is more going on with policy guidelines, which is supported by INGOs etc.

ECCA is not part of the WASH steering committee, why, has ECCA not been approached or is there not enough leverage?

PS: The Government focuses more on INGOs and big NGOs with leverage and that's as well where the money is. But not small NGOs like ECCA. INGOs do work together with their local implementation partners and steer it from these levels.
But we are involved in some committees. You need to ask Yogendra [Chitrakar].

[Yogendra Chitrakar joins the discussion]
We were discussing the issue ECCA's participation in committees. May you provide me with some more detailed information about that?

Yogendra Chitrakar (YC): At the moment we are in the steering committee of DWSS to create new rainwater harvesting guidelines, plus the Lalitpur Municipality Community Development Center and we are member of NWA [Nepal Water and Sanitation Alliance] and FEDWASUN where different WASH NGOs do gather and exchange ideas and support. This community is working nationwide and there is an interest for WATASOL, so it might capitalize very soon. There is the DWA [Dutch Water Alliance] they want to invest money in the WASH sector, firstly they do coordinate with the government and will work on the national, regional and community level, that has been formed 3 years ago.

[…]

You wanted to discuss the issue of pricing and investment about the laboratory as well, right?

PS: ECCA can invest, that's not the problem, we can find somebody or Antenna can invest, the major thing is if there will be a return on that investment.

YC: As we already discussed, there is a lot of demand and we can provide services also, but the major issue is if there is profit and how to do so to balance the investment and the return.

That's what we have discussed before, exactly. But given the actual situation with the price of Piyush, we can not compete in a sustainable manner regarding the price level.

PS: SDC is starting the second project phases and is focusing on a business model in the second phase, so we have to pursue that in order to get funding. Now I'm thinking if we just should increase the price to NPR 40 to see what happens, continue the social and awareness work but increase the price in the market to see if people do still buy it or not.

YC: If we increase the price, Piyush might increase the price as well and we would have the possibility to lower it again.

PS: In the school areas and the local community, would they still buy if we double the price? That's the question.
It would be really interesting to launch such a pilot. But then regarding the whole costing, if you want to scale WATASOL, do you know what the approximate costs per bottle are, included labor costs**.**
Labor costs included, the actual costs are around NPR 20. At the moment, the labor costs are covered by Antenna [Technologies] through the project, so they are not directly reflected now. If labor costs of Rabindra, Bipin and Junu have to be included and the packing is not executed by volunteers, then it will be hard to be sustainable unless it cannot be scaled up to 100'000 bottles.

YC: This product is a social product; you cannot make it a business product. It will not work here in Nepal. ENPHO has tried also many times, but they couldn't manage it.

PS: A pure business model, I don't think it will work, whatever you do, I don't think it will work.

YC: It's a social product.

PS: I think it wont work because of the mass, there is not enough market.

YC: Nepal is not like India, the population is scattered, hilly region, mountain regions, the access is really difficult and the transportation is expensive and time consuming.

PS: After travelling maybe 5 hrs, you will reach a small town, maybe 1000 people living, how many ill be buying it? You spend a lot of money for the transportation. Maybe 40 people, how will that be sustainable?

YC: I think after all, the school part is the best way to do it. Produce WATASOL centralized for the community, pursue awareness programs and social marketing that will work.

PS: Whatever it is, it should be groups, schools that will work, but outside the valley, it [pure business model] will not materialize. Once the groups are made aware, they will buy it. If we are able to approach and reach 1000 groups, the market is itself created.

YC: Now we are inviting women's groups and doing training with them, these groups have families and they have money to buy WATASOL and do business with their families.

PS: Our focus is now more on groups and not mainly on schools anymore, we have to manage both – so it's an extension of the project.

Do you want to focus on selling the product or spreading the technology, because if you are doing both, in the same area of work, it is contradictory somehow.

YC: In case of ECCA, we have to focus on social marketing.

It has to go in line, but exactly, do you want to spread the technology or sell the stabilized chlorine to these groups?

PS: That's one option, but we can provide them with a Mini-WATA device and sell them stabilized chlorine produced by ECCA as a second option.

But that's contradictory. You cannot spread technology in the same market as your stabilized product.

PS: There are two options, you can do both. If we are focusing on the second stabilized option, I can always question you and Antenna, why are they promoting the Mini-WATA device then?

That's the question…

PS: The same question was asked from the SDC project evaluator two years ago. Why is Antenna producing and selling the Mini-WATA devices then? We have to balance the two options.

It's really difficult to balance these two strategies, but you have to distinguish it otherwise you are destroying the market by yourself somehow, it is really a challenging question.

PS: If you are focusing on business approach and selling stabilized chlorine to the masses, business wise it is ok, but there is not everywhere the possibility to reach villages, schools and communities like that. There has to be Mini-WATA devices.
Urban and easily accessible area is easy to sell stabilized chlorine, but in the other areas, there has the Mini-WATA to be used. That should be the strategy.
In other than urban centers, not accessible areas, there are maybe 10'000 - 20'000 schools that we could approach. And there are more than 10'000 community forest users' groups that might be approached. If we are able to work through all these community groups, this will be sufficient work. Because our project isn't that much commercial.

YC: Another thing with Antenna is, when we had a meeting, if we could tie up with bottling companies like Coke, that they could sell the chlorine through their channels, that might be an idea, but they have to take social responsibility, because otherwise it will not be practical. But we are not in the right position to meet them, but maybe with Antenna, Urs [Heierli] and the SDC [Swiss Agency for Development and Cooperation], that might be an option to involve big companies for their social responsibility activities to cooperate with us.

[…]

PS: To reach people in remote areas, far West, the question of shelf-live is a big issue, 6 months is not enough. Therefore you have to divide a strategy for rural and urban areas. Think about that!

[…]

Balkrishna Pokhrel, Program Manger FEDWASUN. Conducted June 23, 2014, FED-WASUN office, Kathmandu.

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Interviewer: How is FEDWASUN organized?
Pokhrel: FEDWASUN is an umbrella organization; it is representing all the users' committees of Nepal on the grass-roots level there are drinking water and sanitation users' committees and it is FED-WASUN who is representing them. At the moment we are active in 58 out of 75 districts, including more than 4000 users' committees as members.
We are currently working in advocacy for drinking water and sanitation in two ways:
- One for policy advocacy and good policy practices on one hand
- On the other: Capacity development of the users. The system of Nepal is that, after the handover of the water supply schemes, the water and sanitation committee is fully responsible to offer the water supply schemes. So in this area, we are conducting some of the capacity development program for the functionality and capacity of the water supply and sanitation schemes and the other policy provision, where policies are not implemented well, where the compliance is low. So we are advocating for the policy compliance on one end and on the other end there are grass-roots level issues, where we are having a role to bridge between the government and the grass-roots level and to implement the good things from the government to the grass-roots level (including multiple stakeholders).

What are the responsibilities of the government and the users' committees?
Policy and legislation says that the users' committees do have the overall responsibility to conduct the water supply and sanitation schemes for operation and maintenance and other things. For the issue of major repair, disaster and emergencies, the government and other stakeholders do have to play the role. But in the regular execution of the scheme, the user's committees are responsible for the operations of the water supply. This includes, the regulation of tariffs and supply, maintaining the water quality and the government has some obligations like the sustainability and functionality of the water supply schemes, capacity for the water quality, management of chlorine schemes. Such types of activities are under the obligation of the government, but there is not a sharp line all the time, both sides take responsibilities or not.

Does the government properly support the User Groups?
As I told you, this is the policy provision in practice it looks a bit different and the policies have not been implemented well. On the construction side, there are problems, due to the lack of competence, knowledge or capacity the water supply schemes are not functioning well. The government has limited capacity and only a few schemes are implemented well up to a certain extend. The government is only doing monitoring and evaluation of the policy provision, but it is not implemented well for the support of the users' committee. What happened after the handover of the responsibility for operation and maintenance, repairs were lacking and some schemes even collapsed.

Water quality, what are you doing in these terms?
Our goal for this year [until April 2015] is to implement the water safety plan in 100 water supply schemes. In these terms we have and will conduct awareness programs to the users' community. We don't give money or products, but we do coordinate the activities with other agencies such as UNICEF, WaterAid etc. to link users' committees to improve their situations. We just do awareness programs and do train local communities in terms of maintenance and water quality testing and implementing the water safety plan in the schemes.

What water treatment products are you promoting or advocating for to the UCs'?
We are creating awareness sometimes with bleaching powder or other chemicals, but the dissemination of knowledge is limited due to the lack of resources and capacity we can't assist the UCs' with the help they would actually need. One important thing I have to mention here is, especially in the rural part is that we want and must be able to use the water without cost – they think water is for free. In these terms, purchasing water quality improvement products is not in the interest of them. In rural areas, in some places the awareness level is quite high and some communities are already using some sort of these water treatment methods in their plant and on the household level as well.

How do you perceive the actual situation of safe water in Nepal, what is the difference between rural and urban areas?
About access: in rural areas, the access to water is more feasible than in urban areas. Most of the urban areas are suffering of sufficient access to water. In rural areas the water quality is an issue as well, but there mainly spring sources are used, which are usually less contaminated, due to less population and a cleaner environment. But in urban areas, due to contamination and the problem of sewerage and the high density of population, it is a bigger issue. During the monsoon it can be a major issue in rural areas due to flooding and landslides that destroy the sources.

How do you work on water quality issues?
We totally focused on water supply and sanitation and are just starting to work on the water quality issue now. So we are advocating for the water safety plan and equally advocate for household treatments as well.

How can you assure that people really get safe water in the long run? What are pertinent issues?
Currently we are working on the ODF campaign, with that we are organizing water treatment systems as well. On district levels, there are FEDWASUN offices as well, which do conduct such types of awareness raising activities along with the ODF campaign.
It will take time and it is difficult to say how long it will take to start a nationwide campaign focusing on water quality, but there is one national quality standard of Nepal which as not been implemented well. According to this provision, by 2015, all of the water supply schemes should implement water safety plans, but we are behind. So advocating for the implementation of the water quality guideline at the government level we are lobbying for that. And on the other hand we are conducting water project management training, sanitation management training and training for maintenance workers and in these training we incorporate the water quality issue and what type of treatments can be used.

Do you think the water quality will be improved in the next period of time?
If we are considering the WASH sector and are talking about drinking water, then I do have to say that the quality issue is totally neglected in the sector. Almost nobody is advocating the quality issue. The fact is that there are more than 40'000 drinking water and sanitation schemes in Nepal, only 18% are fully functional, all the other need maintenance, means minor or even major repairs. So our sector is at the moment fully focused on the functionality of the water supply system. So water quality and water treatment systems are neglected. 2 months ago we made an annual review of the achievement of the WASH sector. And there were some stakeholders' commitments towards water quality maintenance and water treatment. So awareness is increased in people but the quality of the water is yet not improved that much. Even though awareness is gradually increasing, one good development can be seen that water quality has currently been linked to the other health activities and the sanitation part. If you don't treat your water you may suffer from diarrhea etc.

One last question, could you imagine to support a nationwide safe water campaign?
As now almost everybody is focusing on access to water and sanitation (ODF) at the moment, the next step will definitely be to focus on water quality. There should be definitely a cooperation between all stakeholders who focus on water quality issues in the country.
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Dr. Sudan Raj Panthi, National Professional Officer WHO. Conducted on July 1, 2014, WHO HQ, Lalitpur, Kathmandu.

[…]

What is the actual situation of the use of chlorine in Nepal?
The government provides communities and schools mainly with bleaching powder free of cost to treat their local systems. The government buys a lot. But the main problem is how to use the chlorine powder in the communities and in the schools and people don't accept the taste of the chlorine. But there was a cholera outbreak in one district, the government immediately distributed aqua tablets and Piyush to this area – the people used it, but they don't like to drink chlorinated water, they just want to drink it without it – this is the main problem in Nepal. Therefore I'm not sure if the people really want to buy the product or not – because the government is providing it to the people free of cost.

Is it then provided only during emergencies or in general?
Regarding the water safety plan (WSP) there should be chlorine used in the systems all the time to maintain the FRC – requirement is to use it all the time at every point, but that's far from reality.
The WHO organizes trainings for the production of 1% chlorine solution with chlorination powder, how to inject it into the system. And what the people then think is, if the water seems to be very good, then they don't want to use chlorine at all. Besides we inform all participants about the household treatment options – to use them if there is no system in place that can provide you with safe water. That is the only program we are advocating for it, but not beside it.
Normally only few of the big systems and treatment plants use chlorine sometimes. But in the small systems not, people don't want it. Because people perceive the water as pretty good and think the system is safe and there is no contamination coming from. Then why should we add chlorine, that's the perception. If there is good monitoring, then it is ok, but usually that is not done. It is very difficult to test the water quality, especially in the rural areas where the small systems are. If we could maintain a system that is safe, people are better off in terms of price, taste and health, the chlorine is not that good for health in the long run.

Is the water tested on a regular basis?
In the city, sometimes, but in the rural areas testing is very weak, that's why there are outbreaks in the rural areas. People think in the dry season there is no contamination; therefore they don't see a need for treatment. Even in the rainy season, if the system is safe, there can be contamination and turbidity during this time people are more likely and motivated to use chlorine.

Regarding these closed systems, is it recommended to drink the water without treatment?
We don't recommend that and as well the water safety plan states, that you have to maintain free residual chlorine all the time to a certain level, precaution has to be in place.

Where is the contamination coming from?
From sewerage pipes and floods during the rainy season.

What is the actual state of water supply in the KTM valley?
Normally in Nepal, we don't have enough water. The data shows a coverage of 85 %, but if we talk about functionality, then it's not more than 50 percent. And if we talk about this 50% coverage, we don't know what the water quality really is. There is no regular and reliable monitoring system. After my perception, the spring water sources are mainly ok, but there is contamination during the delivery and especially in the Terai region, there are sources high in arsenic and iron. The sources that are streams or rivers are very very bad. And only 12-15% of the systems do have treatment plants.

How would you assess those treatment plants?
They are also not monitored, the technique is not good or not maintained, there are no SOP [standard operation procedures], chlorine is not used throughout, parts of the plant are broken and things like that happen all the time.
Therefore if we really implement the Water Safety Plan in the systems we would know if the water is safe or not, but at the moment nobody can really say it.
There are a few plants that are very good and have already implemented the water safety plan and do monitor the water. But still at the household level the water quality is hard to assess, there are still so many disease outbreaks every year.

Where are those plants located?
Mainly in the urban area, but there are a few in rural areas as well.

Regarding the WSP, how does it work?
The WHO provided technical support to the government. The government goes to the community and provides some kind of training to the operators of every water supply users' committee [Water Users and Sanitation Committee (WUSC)]. This is a social committee that is formed to operate and manage the water supply system, they are operators and service providers in that sense.

In terms of the use of chlorination products, do you advice or recommend the government to use a specific brand?
No. Normally we recommend them not a specific brand, but the should know about the theory behind the use of chlorine. Like if you store the chlorine too long, the effect will be reduced, bleaching powder should be stored in a dry place. We train them how to use and prepare the chlorine solution, bleaching powder is preferred because of the price.

Is any certification for the chlorine required to use it for the WHO?
These products are complying with the national standard and are branded.

At the moment there is a lot focus on water quantity and ODF regarding MDG 2020, what is going on regarding water quality?
We are far behind, the Nepali government is mainly focusing on sanitation and access to water. Even regarding the ODF, I'm not sure how sustainable it is, whether people will start open defecating again or not. Regarding the water supply as mentioned earlier, there is still a big issue of the coverage and it's really difficult to cover the last 15% in the rural and remote areas mainly. Quality is given less priority and there has to be done much.
National drinking water quality standard, there is regulations and guidelines how to achieve the national target and how to comply with the standard, but there is no compliance with this regulation. There is no systematic monitoring.

What is the WHO doing in these terms?
We are advising the government what and how they could achieve it referring to the WSP as a policy level document. And should manage to implement the WSP in the system. If that will be executed and pursued, then there will be automatically a monitoring and external auditing (water quality surveillance) system in place.

Beside this policy advice, are you involved in the implementation process?
We do advocacy and capacity building and provide technical support – but besides the government is responsible for that. There are some other INGOs supporting the government.

What might be a timeframe?
You can't say that. It's very difficult. We don't need money, but commitment and more knowledge and technical support to improve the situation gradually. And in most of the cases to implement the WSP we will need chlorination, if there is no sophisticated system and modern treatment plant for disinfection. It should be in the system, but because of problems to maintain the FRC, the household level is an option as well. In the cases of emergencies, household level use is important.
Bacterial contamination is the major problem in Nepal, only in the Terai there is some problem with iron and arsenic. Till 2017 the government's plan is that 25% should have improved quality and then step by step it should be achieved. But it will not be possible. The big problem is that there is no baseline data about water quality, how many people do use safe water and have access to safe water.

Does the WHO push for POU treatment?
The WHO is pushing the WSP, we could push for household treatments, but we don't because of the WSP, which works on a different level. But within the WSP, if there is no proper treatment on a higher level, then the last option is the use of household treatment products, which is as well part of the WSP and we do encourage people to do so.

But still people are not relying on treatment. What has to be done in terms of awareness? How aware are people?
In the urban areas, people are quite aware of water quality issues, using RO, UV and filtration, but much less in rural areas and among the poor people. Even if you provide the people with chlorine solution free of cost, they are reluctant to use it and say, that they have been using untreated water ever since and didn't get sick – we are strong enough, why should I take the taste if I don't need it?

How much would an average treatment cost?
You cannot generalize that. But if people do earn not that much, then it could go in a day. In bigger hospitals, it costs a lot. Low level salary is [NPR] 10'000 that can easily used a day.
In community hospitals, the conditions are pretty bad.

Do you cooperate with the UNICEF?
Normally we do work together in the coordination committees and work together on WASH, but on project level, there is no direct bilateral agreement in place. But in emergency cases there is a cooperation to allocate money and manpower.

Water quality in the future – what is WHO's plan? What are your programs for water quality till 2020?
Obviously there is a lot to do. The WSP is the only solution for moment. All the water suppliers, all the service providers should implement the WSP. If it will be implemented, it includes everything, the monitoring, the assessment, everything. If these stakeholders do know about the WSP, know how to implement it properly and maintain it, and a monitoring and auditing system is in place, then the quality issue will be improving gradually. If we don't have big treatment plants, people can go for the household level treatment and the government can gradually improve the whole infrastructure.

Is there any possibility and capacity in place for the WHO and other organizations to support a nationwide safe water campaign (if it is set up in cooperation with the government)?
I think it is necessary because recently we had a national joint sector review meeting from the WASH sector. There were separate thematic working groups and there was one water quality working-group. I was part of it and we recommended that, there was a lot of emphasize on sanitation and the ODF but we are far behind for water quality. I think it is the right time to do something for water quality otherwise it's impossible to improve the public health.

Who would steer such a campaign?
Either the national sanitation committee or otherwise if that's not possible there would be a need to look for a separate coordination or steering mechanism. For such a campaign it would be the National Hygiene and Sanitation Coordination Committee [NHSCC] but either they should revise this name with a different scope and TOR otherwise they should organize a separate coordination committee that looks after the water quality and the water safety plan. There are all WASH stakeholders, including ministry of education / health etc.. There is influence from the ministry of urban development, and the DWSS, but more working on a district level. There is less participation of the ministry of health, although health is very important to look after these issues but they are not that much active, because they are busy with other issues, e.g. HIV, there is a lot going on. Maybe after that there will be a progress.

There is an issue at the moment that ENPHO is reducing its supply and without funding it might disappear, what are you intending to do in the future if Piyush is not readily available anymore?
We could imagine to purchase of WATASOL for emergencies as possibility, because Piyush is not always available, they don't have that much stock either and sometimes already we had to rely on bleaching powder and Aquatab in some cases because we couldn't distribute Piyush.

[…]

Declaration of Authorship

I hereby declare

- that I have written this thesis without any help from others and without the use of documents and aids other than those stated above,

- that I have mentioned all used sources and that I have cited them correctly according to established academic citation rules.

Dürrenäsch, 15.5.2015 Raphael Graser