

Water Supply in Bacolod City

Managing water supply in a medium sized city in the Philippines



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Tubig ng Bayan

(Water for the Masses)

Cover: Photo's of wall paintings on the office of the Bacolod City Water District (by the Author).

PREFACE

PRU-TUBIG

Tubig means water in Filipino.

The acronym PRU is a play on the word pro - meaning "for".

Here, responsible users of water are considered pro-water or, in this case, PRU-TUBIG

The above stated was the slogan of a project set up by the Presidential Task Force on Water Resources Development and Management launched on World Water day 1997 in the Philippines. This campaign underlined the importance and care for responsible use of water. Water is vital for human and all forms of life. The United Nations Human Rights Declaration of 1947 has recognized water as a basic human right. That is why the use of water, as well as the access to an adequate water supply should be equal to all. This however is often not the case as freshwater is unevenly distributed geographical and temporally. That is why the subject of water and the access to water has interested me. Eventually I decided to do my MA thesis on the subject of water supplies in a developing country.

One of the main goals in my study was to do research in a developing country. I eventually was given the opportunity to go to the Philippines. I visited the Philippines from the end of february, up to august 2004. The total 5 months stay in the Philippines was a first time experience. The making of this thesis was my first time experience in performing an independent research. Both have been a very interesting and in formative experience. The primary data collection for my thesis has been performed in Bacolod City, Negros Occidental, in the Philippines. In Bacolod City I was able to carry out my research in regard to water supply with the assistance of the Balayan Staff at the University of St. La Salle (USLS). Therefore I would like to thank Cesar Villanueva (president of Balayan), Ericson "Riggs" Alarcon, Terai Barcoma and the entire Balayan Staff as well as all the volunteers in facilitating my stay in Bacolod City. I would like to wish you all prosperity and bliss, and I hope that my research can contribute to further studies or projects.

My time of stay in Bacolod City has given me the opportunity to meet new friends as well as learn many things about a different culture and society. Although this has sometimes been frustrating; it was a remarkable challenge. I would like to thank my friends Allen Casilao (Ronny), Eda Mea, and Grace Alvarez for their hospitality and the good times we have spend together in Bacolod City. In addition I would like to thank my friends Ivo Haenen and Femke Hoekstra, which have been wonderful travelling companions and have supported me in my research. Furthermore I would like to thank Peter Druijven in facilitating and supervising the process of my research. Thanks to Karin and Christy, my interpreters and the family Loarca for their hospitality and friendship. In addition I would like to say 'salamat gid' to all the key informants, barangay captains, barangay health workers and respondents that have helped me gather information for my research.

Last but not least I would like to dedicate this thesis to my parents and family for giving me the possibility to, as well as their undivided support in my studies. It has been a long term process. However, I am now pleased to say that this thesis is finally finished. I hope you will enjoy reading the thesis, and if there are any comments or remarks, don't hesitate to send me a message. And if there are people I have forgotten to thank and mention above, I would like to thank you all for your support.

"salamat gid"

Willem-jan Spreeuwens, January 2006

TABLE OF CONTENT

PREFACE	I
TABLE OF CONTENT	II
SUMMARY	V
GLOSSARY OF TERMS	IX
LIST OF FIGURES AND TABLES	X
1 THEORETICAL FRAMEWORK	1
1.1 INTRODUCTION.....	1
1.2 URBANIZATION, POVERTY AND WATER SUPPLY.....	1
1.2.1 URBANIZATION.....	2
1.2.2 POVERTY	2
1.2.3 HOUSEHOLD WATER SUPPLIES IN URBAN AREAS.....	3
1.3 THE CONCEPT OF HOUSEHOLD WATER SECURITY	5
1.3.1 HOUSEHOLD WATER SECURITY.....	5
1.3.2 SUFFICIENT SAFE WATER FOR DOMESTIC USE	6
1.3.3 THE CONTEXT OF THE MOST VULNERABLE.....	7
1.3.4 WATER AVAILABILITY ISSUES	8
1.3.5 ACCESS AND USE	10
1.4 RESEARCH QUESTIONS AND OBJECTIVES.....	12
1.5 METHODOLOGY	12
1.5.1 COLLECTION OF PRIMARY DATA.....	13
1.5.2 SELECTION OF THE CASE STUDY AREAS.....	14
1.5.3 SELECTION OF THE HOUSEHOLD.....	16
1.5.4 THE QUESTIONNAIRE, CONVERSING AND FOCUS GROUP DISCUSSION	16
1.6 OPERATIONAL DEFINITIONS	17
1.6.1 CONCLUSION.....	18
2 THE SETTING	19
2.1 INTRODUCTION.....	19
2.2 BASIC GEOGRAPHIC CHARACTERISTICS OF THE PHILIPPINES.....	19
2.2.1 THE PEOPLE	20
2.2.2 POVERTY	20
2.2.3 URBANIZATION.....	20
2.2.4 URBAN POVERTY	21
2.2.5 WATER SUPPLY	21
2.3 BASIC GEOGRAPIC CHARACTERISTICS NEGROS OCCIDENTAL	22
2.3.1 ECONOMY	23
2.3.2 POVERTY	24

2.4 BASIC GEOGRPAHIC CHARACTERISTISCS BACOLOD CITY.....	24
2.4.1 WATER AND SANITATION	25
2.5 THE CASE STUDY AREAS	26
2.5.1 KAPAWA	28
2.5.2 MASIPAG	29
2.5.3 PARAISO	30
2.5.4 BARANGAY 7 – PUROK MAGNOLIA.....	31
2.5.5 BARANGAY BATA – PUROK SAWMILL	33
2.6 SUMMARY	35
3 WATER AVAILABILITY.....	36
3.1 INTRODUCTION.....	36
3.2 NATIONAL WATER POLICIES AND INSTITUTIONS.....	36
3.2.1 URBAN WATER SUPPLY IN THE PHILIPPINES.....	37
3.2.2 THE NATIONAL WATER RESOURCES BOARD (NWRB).....	38
3.2.3 LOCAL WATER UTILITY ADMINISTRATION (LWUA) AND THE WATER DISTRICTS	38
3.2.4 WATER RESOURCE AND WATERSHED MANAGEMENT	39
3.3 THE WATERSHED OF BACOLOD CITY	42
3.4 WATER SUPPLY IN BACOLOD CITY: THE BACIWA.....	44
3.4.1 INTRODUCING THE BACOLOD CITY WATER DISTRICT	45
3.4.2 PRODUCTION CAPACITY	46
3.4.3 NON REVENUE WATER (NRW)	47
3.4.4 SERVICE AREA AND ORGANIZATION STRUCTURE.....	47
3.4.5 WATER RATES	48
3.4.6 SECURING WATER QUALITY	49
3.4.7 BACIWA POLICY OF HOUSEHOLD CONNECTIONS	49
3.5 WATER SUPPLY IN BACOLOD CITY: ALTERNATIVE SUPPLIES.....	51
3.5.1 THE DPWH AND THE CITY ENGINEERS (CE)	52
3.5.2 WATER QUALITY AND THE CITY HEALTH OFFICE (CHO)	54
3.5.3 DEEP WELLS, DUG WELLS, PEDDLERS AND PURIFIED/MINERAL WATER.....	54
3.6 SUMMARY	56
4 THE CASES: HOUSEHOLD WATER SUPPLY	57
4.1 INTRODUCTION.....	57
4.2 GENERAL RESPONDENT AND HOUSEHOLD CHARACTERISTICS	58
4.3 WATER SUPPLIES IN THE SURVEY AREAS: AVAILABILITY	60
4.3.1 CONNECTIONS TO THE BACIWA SERVICES	60
4.3.2 DRINKING WATER SUPPLIES: KAPAWA, MASIPAG AND PARAISO	62
4.3.3 DRINKING WATER SUPPLIES: MAGNOLIA AND SAWMILL	63
4.3.4 WATER SUPPLIES FOR ALL OTHER PURPOSES	64
4.3.5 THE BARANGAY PUNTA TAYTAY WATER SERVICE SYSTEM (BPWSS)	66

4.4 ACCESS AND USE OF WATER SUPPLY.....	68
4.4.1 PERCEIVED QUALITY OF DRINKING WATER.....	68
4.4.2 PROPER CONSUMPTION AND USE OF WATER SUPPLY	70
4.4.3 SATISFACTION WITH CURRENT WATER SUPPLY.....	73
4.5 WILLINGNESS AND ABILITY TO PAY FOR IMPROVED WATER SUPPLIES.....	74
4.5.1 WILLINGNESS TO PAY FOR PIPED WATER: KAPAWA, MASIPAG AND PARAISO	75
4.5.2 WILLINGNESS TO PAY FOR PIPED WATER: PUROK SAWMILL	77
4.5.3 FUNCTIONING AND AFFORDABILITY OF BACIWA IN PUROK MAGNOLIA	77
5 ANALYSIS.....	79
5.1 INTRODUCTION.....	79
5.2 COMPARING DIFFERENCES IN AVAILABILITY.....	79
5.3 COMPARING DIFFERENCES IN ACCESS AND USE	82
5.3.1 COMPARING HOUSEHOLD ACCESS TO DRINKING WATER SUPPLIES	82
5.3.2 DRINKING WATER QUALITY AND USE	85
6 CONCLUSIONS AND RECOMMENDATIONS	87
6.1 ANSWERS RESEARCH QUESTIONS	87
6.2 RECOMMENDATIONS.....	93
6.3 CONCLUSION.....	96
REFERENCES	97
APPENDIX 1: PHILIPPINE POLITICAL MAP	I
APPENDIX 2: NATIONAL STATISTICS: FAMILIES BY MAIN SOURCE OF WATER SUPPLY	II
APPENDIX 3: THE QUESTIONNAIRE.....	III
APPENDIX 4: RESULTS QUESTIONNAIRE USED IN THE RESEARCH	VIII
APPENDIX 5: SUCCES STORY PUROK HIDDEN PARADISE	XII

SUMMARY

CHAPTER 1: THEORETICAL FRAMEWORK

At present the world's population is growing rapidly. The scale and speed of this growth is concentrated in the urban areas of the developing countries. This rapid growth of urban areas is causing many problems for the governments and residents of the cities in developing countries. One of the main problems that occur in these cities is the lack of access to adequate water supplies. The subject of this thesis is on the efforts of urban poor households in Bacolod City to attain access to a sufficient safe water supply. Special attention is given to the urban poor households, which are considered to be most vulnerable in attaining access to adequate water supplies. This subject is examined by using the conceptual framework of household water security (Webb & Iskandarani, 1998). The three primary components of this conceptual framework i.e. the availability, access and use of water serve as a guideline in the collection and analysis of data. The subject of availability explores the high and reliable supply of water as a resource. In this thesis the subject of availability is examined on the regional and city level. The other two key elements of access and use of the available water supplies are examined on the local and household level. The main question that will be addressed is: By what means do households in Bacolod City secure access to a sufficient safe water supply? The following sub-questions have been outlined:

- 1. What are the roles of the public and the private sector in securing the availability of a sufficient safe water supply for the households in Bacolod City?*
- 2. Does the public sector in Bacolod City encounter any problems in securing the availability of a sufficient safe water supply for the households?*
- 3. Are there any problems in the access to and eventual use of the available water supplies as perceived by the researcher and the resident in the squatter areas of Bacolod City?*
- 4. Are there any spatial differences in the access to sufficient safe drinking water supplies for the households within and between squatter areas in Bacolod City? And if there are spatial differences in access to potable water supplies, what is the nature of the main differences?*
- 5. How can the main problems related to the availability and access to a sufficient safe water supply in Bacolod City be improved?*

After collecting secondary data, a selection was made in reference to the research methods to collect primary data i.e. key-informant interviews, household survey using a questionnaire, and focus group discussions. The data was collected in five case study areas located in the city of Bacolod, the Philippines.

CHAPTER 2: THE SETTING

The Philippine archipelago is situated in South-eastern Asia and has more than 87 million residents. The Philippines is a highly urbanized country. Poverty is widespread in these urban areas. Many of the urban poor live in large squatter areas. Obtaining access to sufficient safe water supplies is a daily problem for many Philippine families that live in the large and medium sized cities. The city of Bacolod, the capital city of the province of Negros Occidental, is one of these medium sized cities. Bacolod City has a total population of 429,076, and is located on the north-western coast of the province. The city is growing rapidly, and the majority of the residents do not have access to piped water supplies or adequate sanitation facilities. The subject of access to water supplies in Bacolod City is examined on the household level in case study areas. Five case study areas were selected i.e. purok Kapawa, Masipag, Paraiso, Magnolia and Sawmill. All the case study areas are predominantly squatter areas in which a substantial concentration of urban poor households resides. These case study areas are located in three different barangays across the city of Bacolod, with two main differences in characteristics: a coastal-inland and rural-urban. The goal of this research was to find out if there were any spatial differences as regards the household access to sufficient safe water supplies in and between these case study areas.

CHAPTER 3: WATER AVAILABILITY

The key element of water availability is examined on the national and regional level. In the first place several important national policies (for example the PD 198, the Water Code or PD 1067 etc) and the roles of several governmental institutions (NWRB, LWUA, Water District) involved in the management of water resources and water supplies in the Philippines are examined. Due to its geographical location, the Philippines have abundant water resources (Barba, 2004). The water resource management in the Philippines is largely an inter-sectoral affair. Watersheds play an important role in securing the availability of water resources. The national government in the Philippines is planning to develop a watershed based management program to secure sufficient safe water resources. More than 60 percent of all the watersheds in the Philippines is estimated to be in critical condition. This is also the case of the Bacolod City watershed; better known as the Caliban-Imbang watershed. However, a local NGO called the NFEFI is putting efforts in rehabilitating and protecting the Caliban-Imbang watershed. The Bacolod City Water District (BACIWA) is also showing increasing interest in rehabilitating and protecting the watershed, to secure the availability of sufficient safe water resources for present and future needs.

At present the BACIWA is the only public piped water service system available in Bacolod City. The service area of the BACIWA covers approximately 60 percent of the city. However, only half of the residents within this service area are actively served. The other 70 percent of the residents in Bacolod City make use of alternative public or private water supplies. In the city of Bacolod the alternative public water supplies are provided by the Department of Public Works and Highways (DPWH), City Engineers (CE) or the Local Government Unit (LGU). These public agencies provide the residents of Bacolod with mainly level 1 water services, which are artesian wells (hand pumps) or community water systems. These hand pumps are widely used by the urban poor households. There are however also several private water supplies available in Bacolod City i.e. private deep wells with electric or hand pump, dug wells, and bottled purified water or water peddlers. The quality of these water supplies is secured and tested by the Barangay Health Workers and the City Health Office. The question remains which water supplies are actually utilized by the households; what is the perceived quality of the water supply; and do the residents of the squatter areas in Bacolod City have access to these water supplies?

CHAPTER 4: ACCESS AND USE

To examine the access and use of water supplies by households in the squatter areas of Bacolod City, several case study areas were surveyed. The measured general household characteristics confirmed the presumed assumption that the case study areas were squatter areas. There were several different water supplies utilized in all the case study areas. Only one area was located within the service area of the BACIWA: purok Magnolia. The residents of all the other case study areas are required to utilize public or private alternative water supplies. For their drinking water supplies the majority of the respondents in the case study areas of barangay Punta Taytay i.e. Kapawa, Masipag and Paraiso depended upon water peddlers to sell them containers with water. The respondents in Sawmill however mainly utilized the public hand pumps as their main supply of drinking water. For their water supply for all other purposes the majority of the respondents, with the exception of purok Magnolia, stated to make use of the available public and private hand pumps.

The drinking water was perceived to be of a good quality by the majority of the residents in all case study areas. In some cases there was still a large group that feared falling ill from the drinking water. There were not many respondents that claimed to make use of safety measurement e.g. filtering or boiling the water before consumption. A majority of the respondents also did not make use of conservation methods, even though they often did receive information in regard to conserving water. To conclude the examination of access to sufficient safe water supplies on the household level the majority of the respondents stated to be very satisfied with their current water supplies. These respondents however did also claim that there were several improvements required. A household connection to the BACIWA was seen as a major improvement. A large majority of the respondents was willing to pay for a connection to the BACIWA, but they were not sure if they could afford it. There are many constraints in regard to the access to BACIWA water supplies for residents of squatter areas (e.g. initial connection costs, land tenure etc.).

CHAPTER 5: ANALYSIS

The data collected in the household survey shows large differences in and between the case study areas. These differences are examined and explained by means of the three key elements in the conceptual framework of household water security. The main differences in and between the availability and access to water supplies in the case study areas are for the most part caused by the location and physical geography of the areas. In only a few cases the seasonal and timely availability or the choices household made in relation to a water supply were the reason for differences that had occurred between the case study areas. This difference in the available water supplies highly influenced the household access to a sufficient safe water supply. The differences in the actual access to a sufficient safe water supply however also depended on other aspects i.e. the financial opportunities, choices a household makes in relation to available alternative water supplies, willingness and ability to connect to the BACIWA etc.

Even though many respondents are very satisfied with their current water supplies, the majority is still willing to pay for access to improved water supplies in the manner of a BACIWA connection. There are however several obstacles to overcome for households, in particular in the squatter areas, before they can actually attain access to improved water supplies i.e. piped water services from the BACIWA. The main differences between the case study areas as regards to their opportunities to access improved water supplies are caused by their geographical location in the city and the location of the household in reference to the main water lines as well as the ability to meet the requirements for an initial connection.

The last key element in the conceptual framework of household water security is the actual use of water supplies by the household. The main focus of this matter was on the household's perception on water quality and the proper use of the available water supplies. The main differences in the perceptions on water quality and the proper use of water supplies were caused by the available water supplies between the case study areas. In general it can be concluded that the foremost differences on the subjects of availability, use and access to available water supplies have occurred between the case study areas, located in the different barangays, and thus not within the barangay and puroks.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

In the last part of this thesis the main questions are discussed and several conclusions of the research are drawn up. The goal of this research was to explore and describe the household's access to available water supplies in Bacolod City, with a focus upon the residents of squatter areas.

The first question was to indicate *the roles of the public and the private sector in securing the availability of a sufficient safe water supply for the households in Bacolod City*. On the regional level there are many actors involved in the management and planning of the available water resources. The focus is however mainly upon the city level. On the city level there are several public agencies e.g. the BACIWA, DPWH, CE and the LGU's involved in securing adequate safe water supplies. These public agencies do not coordinate or cooperate with each other, or with the private sector. In the private sector several actors are providing alternative water supplies. The most important private sector water supplies for the residents of squatter areas are the water peddlers.

The second question was to find out if *the public sector in Bacolod City encounters any problems in securing the availability of a sufficient safe water supply for the households*. The main problem is that there is a clear lack of an integrative mechanism to interrelate the different functions and agencies that utilize and manage the water resources. As regards the water supplies on the city level the public agencies, i.e. the BACIWA encounter several management and operational problems in securing the availability of sufficient safe water supplies in Bacolod City. These problems can not be solved overnight.

In addition to the availability of water supplies it is important to find out if the household actually have access to the available water supplies. The third question was to find out if *there are any problems in the access to and eventual use of the available water supplies as perceived by researcher and the resident in the squatter areas of Bacolod City*. Even though the majority of the residents in squatter areas depend upon alternative public water supplies, they would like to have access to improved water supplies in the manner of a BACIWA connection. However, it has proven to be increasingly difficult for the residents of squatter areas to attain access to BACIWA services for the reasons of e.g. the geographic locations of the housing unit (in reference to the main water lines); meeting the requirements for an initial connection (land tenure); the household's ability to pay for the initial connection; and the ability to pay the monthly expenses. An additional problem is that, even though there are many alternative water supplies available in the squatter areas, these are not always adequate or reliable to ensure the households access to a sufficient safe water supply. There are thus still problems that the residents in the squatter areas of Bacolod City encounter in obtaining access to and eventual use of the available water supplies.

There are many different reasons for the differences in household access to adequate water supplies. The main focus of this research however was, to find out if *there are spatial differences in the access to sufficient safe drinking water supplies by the households within and between squatter areas in Bacolod City*. And if there were spatial differences in the access to sufficient safe drinking water supplies, what was the nature of the main differences. In the analysis of the data collected on household level several differences between the case study areas were identified. The main reason for this difference was the availability of assorted water supplies, the physical geography and the location of the household within the area. It was concluded that there is a clear spatial difference in the access to sufficient safe water supplies by households within, but mainly between the squatter areas in Bacolod City.

The last question in this research is: *how can the main problems related to the availability and access to a sufficient safe water supply in Bacolod City be improved?* One of the main problems as regards the availability is that there is no adequate monitoring and management of water resources in Bacolod City. A possible improvement for this problem would be the implementation of an IWRM, based upon the watershed. On the subject of the distribution of water supplies the main problem is that, at present the BACIWA system covers only 60 percent of the city, and provides merely 30 percent of the residents with piped water supplies. Extending and improving the operations and services of the BACIWA is fundamental for improving the household access to a sufficient safe water supply. In particular the residents of squatter areas have difficulties connecting to the BACIWA. The setting up of schemes for making the initial connection fees affordable is therefore recommended. Legalizations of squatter settlements have shown to improve the ability and willingness to invest in basic services as well. In regard to the alternative water supplies, which are predominantly supplied by the DPWH and the CE, there is a need to increase budgets and positioning water supplies as a priority on the agenda. The last recommendation is the development of adequate policies. The low-income households should stand central in the setting up of policies. The people need be educated and involved in the formulation of water strategies to ensure adequate access to water supplies for all households in Bacolod City.

Last but not least it needs to be acknowledged that the use and applicability of the conceptual framework of household water security in this research has been very limited. The data presented in this thesis is also not without errors or biases and cannot be considered as valid for the barangays or Bacolod City, nor for squatter settlements within the city. An important aspect of the research is that the data is gathered during the dry season and at the start of the rainy season. The results of the survey therefore are seriously influenced by the seasonal differences which are inherent to the household access to water supplies. Precaution with the use and interpretation of the figures and results presented in the research is thus recommended. This thesis is mainly descriptive and explorative in nature, and can serve as an input for continuing discussion as regards improving the access to adequate water supplies for the urban poor households in Bacolod City.

GLOSSARY OF TERMS

ADB	Asian Development Bank
BCWD / BACIWA	Bacolod City Water District/ Bacolod City Water Authority
BDP	Barangay Development Plan
BHA	Bacolod Housing Authority
BHW	Barangay Health Workers
BPW	Bureau of Public Works
BPWSS	Barangay Punta Taytay Waterworks Service System
CE	City Engineers
CHO	City Health Office
DENR	Department of Environmental and Natural Resources
DOH	Department of Health
DPWH	Department of Public Works and Highways
EDP	Economic Development Plan
GSIS	Government Service Insurance System
IWRM	Integrated Water Resource Management
JICA	Japanese International Cooperation Agency
LWUA	Local Water Utility Administration
LGU	Local Governmental Unit
MWSS	Metropolitan Waterworks and Sewerage System
NAWASA	National Waterworks and Sewerage Administration
NEDA	National Economic and Development Authority
NFEFI	Negros Forest & Ecological Foundation Inc
NGO	Non Governmental Organization
NNFR	North Negros Forest Reserve
NRW	Non-Revenue Water
NSDW	National Standard for Drinking Water Philippines
NSCB	National Statistics Coordination Board
NSO	National Statistics Office
NWRB	National Water Resources Board
NWRC	National Water Resources Council
PAMB	Protected Areas Management Board
PD	Presidential Degree
RPA	Republican Proletarian Army
RWSA	Rural Water Supply Association's
SEP	Socio Economic Profile
UN	United Nations
UNDP	United Nations Development Programme
WB	World Bank
WHO	World Health Organization

l/c/d – Litres per Capita per Day

php – Philippine Peso (1 USD = 51 php)

LIST OF FIGURES AND TABLES

	Title	Page
Figures*		
Figure 1.1	Cumulative impacts of deprivations.	3
Figure 1.2	Conceptual diagram of household water security.	6
Figure 1.3	Location of the case studies within Bacolod City.	15
Figure 2.1	a) Map of the Visayas.	22
	b) Map of Negros Occidental.	22
Figure 2.3	Population Growth Bacolod City.	24
Figure 2.2	Map of Bacolod City and location of Bacolod City in the province of Negros Occidental.	25
Figure 2.4	a) Office of the Local Water District BACIWA.	26
	b) A small polluted river running through the city.	26
Figure 2.5	Drawn up map of barangay Punta Taytay, with the location of the three puroks within the barangay .	27
Figure 2.6:	a) Beach views Punta Taytay.	28
	b) Entrance Barangay Punta Taytay.	28
Figure 2.7	a) Views in purok Kapawa.	29
	b) Fishponds for prawn fishing near purok Masipag	29
Figure 2.8	a) Fisherman cleaning and repairing their nets on the paraiso beach.	31
	b) A beach cottages for commercial use.	31
Figure 2.9	Map of Barangay 7 with the location of purok Magnolia.	32
Figure 2.10	a) Eskinita in purok Magnolia and houses made of more durable materials.	32
	b) Squatter houses near the swamp.	32
Figure 2.11	Map of barangay Bata, with the location of purok Sawmill.	33
Figure 2.12	a) The visibly polluted stream running on the border of purok Sawmill.	34
	b) A hand pump between the houses in an alley in purok Sawmill.	34
Figure 3.1	Interagency collaboration in water use regulation.	40
Figure 3.2	Map with the location of the Upper Caliban Imbang Watershed.	42
Figure 3.3	Loss of primary forest in Negros island.	43
Figure 3.4	Coverage Bacolod water utility system according to the Phase I, II and II developments programs .	45
Figure 3.5	a) Spaghetti connection of BACIWA lines.	48
	b) Illegal water tapping in the city of Bacolod.	48
Figure 3.6	An example of a jetmatic hand pump.	52
Figure 3.7	a) An example of a dug well.	55
	b) Peddler filling containers at water pump.	55
Figure 4.1	a) New main water lines constructed near the main road.	61
	b) Water meters and water lines at the entrance of purok Magnolia, barangay 7.	61
Figure 4.2	Drinking water supply sources per purok 1 (dry season figures).	62
Figure 4.3	Drinking water supply sources per pruoek 2 (dry season figures).	63
Figure 4.4	Water sources used for purposes other then drinking water per purok (dry season figures).	65

Figure 4.5	a) Purified water delivery.	66
	b) Children washing and bathing near the public dug well.	66
Figure 4.6	Percentage of respondents and their perceived quality of drinking water sources per purok.	69
Figure 4.7	Hand pumps in purok Sawmill with different sorts of filters attached to the pump.	71
Figure 4.8	a) Washing clothes at the hand pump.	72
	b) Water saving tips handout from the BACIWA.	72
Figure 4.9	Rating the quality of the water supply per purok .	73
Figure 4.10	willingness to and ability to pay for connection to the BACIWA per purok	75
Figure 4.11	a) peddler at water filling station in Sum-ag;	76
	b) washing clothes near the hand pump and the public dug well	76
Tables		
Table 1.1	World population growths by region.	2
Table 2.1	Families by main source of water supply by income stratum, urban-rural residence in the Philippines.	21
Table 2.2	Population characteristics in case study areas Punta Taytay.	28
Table 2.3	Summary of characteristics case study areas.	35
Table 3.1	Historical development of the BACIWA water rates.	49
Table 3.2	New service connection installation charges for residential connection in php.	50
Table 4.1	General respondent characteristic per purok.	58
Table 4.2	percentage of respondents divided in an estimated monthly household income category per purok.	59
Table 4.3	Percentage of respondents that own/do not own house or lot per purok.	59
Table 4.4	Securing water quality per purok.	70
Table 4.5	Safety measurements of various water sources per purok.	70
Table 4.6	Practicing saving measurements and source of information per purok.	72
Text box		
Box 1.2	Privatization fails to plug the water woes.	10
Box 2.1	Flood Prone Areas in purok Masipag.	30
Box 3.1	Water resources in Metro Cebu.	41

* All figures that do not have a source mentioned originate from the author.

1 THEORETICAL FRAMEWORK

The first chapter of this thesis will review the data and theories in regard to urbanization, poverty and securing a sufficient safe water supply in developing countries. In the later parts of this chapter the main question, as well as the subjects and issues of the research are introduced. Finally, the methodology and the operational definitions will be specified.

“The test of our progress is not whether we add more to the abundance of those who have much; it is whether we provide enough for those who have little.”

- Franklin Delano Roosevelt.

1.1 INTRODUCTION

This thesis examines the subject of household water supply in the medium sized city of Bacolod in the Philippines. It is an exploratory research with a focus upon the urban poor households in Bacolod City. Water is a basic human need and every household needs access to sufficient safe water supplies to ensure their survival and maintaining good health. It is estimated that presently over 1 billion people still lack access to a basic supply of water, and more than 2 billion people lack access to adequate sanitation facilities (UN, 2002). And, due to rapidly growing populations, urbanization and industrialization, securing a sufficient safe water supply has become a serious problem.

Before reviewing the subject of household water supply in Bacolod City, attention needs to be given to the theoretical background of the subject. The next paragraph will start with a short introduction to the subjects of population growth and urbanization. As mentioned above, the main issue of the thesis is the water supply for the urban poor households in developing countries. Therefore, the second paragraph will illustrate a short outline of the subjects of urban poverty and the water supply of urban poor households in developing countries.

To explore the subject of household water supply in more detail, the concept of household water security is discussed in paragraph three. Webb and Iskandarani (1998) have developed a conceptual framework of household water security. This framework is used as a guideline in the actual research performed in Bacolod City as well as in the analysis of data. In this conceptual framework, household water security is divided into three key elements i.e. availability, access and use. These three key elements are drawn up in more detail in paragraph three, part four and five. After introducing these basic theories, the research questions, objectives, the methodology and the operational definitions of this thesis are illustrated in respectively paragraph four, five and six.

1.2 URBANIZATION, POVERTY AND WATER SUPPLY

This paragraph will deal with the general issues in reference to the subject of this thesis. After a short indication of population growth and the concentration of this growth, the focus of this paragraph will turn to the water supplies in urban areas. As will become clear in this paragraph, in many cases the urban poor are the first to suffer from inadequate water supplies. Therefore the next part will concentrate upon the subjects of urban poverty, water supply and the problems as regards to water supply for the urban poor households in developing countries.

1.2.1 URBANIZATION

The world's population at present is growing rapidly with an estimated annual growth of 0.97 percent (UNDP, 2003). The annual rate of growth in the less developed regions however far exceeds the annual growth rate in the developed regions (see table 1.1). And, whilst today already more than half of the world's population is estimated to live in urban areas, the current population growth is still primarily concentrated in the urban areas. Accordingly, it can be concluded that the speed and scale of the population growth with an estimated 2.3 percent a year, is predominantly concentrated in the urban areas of the developing countries.

This rapid extend of urban areas in developing countries is causing additional problems for the living conditions of the general population. A growing number of people will need gradually growing scarce resources, find adequate housing, and obtain access to basic services. The national and local governments in the developing countries often do not have the capacity to continue and maintain providing adequate basic services i.e. water supplies to a rapid growing urban population. In this research the focus will be upon the urban poor households, which are facing the challenge of competing for their share of the increasingly growing scarce water supplies in the urban areas.

Table 1.1: World population growth by region.

	Population (billions)					Average annual rate of change (%)	
	1950	1975	2000	2003	2030	1950-2000	2000-2030
Total population							
World	2.52	4.07	6.07	6.30	8.13	1.76	0.97
More developed regions	0.81	1.05	1.19	1.20	1.24	0.77	0.13
Less developed regions	1.71	3.02	4.88	5.10	6.89	2.10	1.15
Urban population							
World	0.73	1.52	2.86	3.04	4.94	2.72	1.83
More developed regions	0.43	0.70	0.88	0.90	1.01	1.45	0.47
Less developed regions	0.31	0.81	1.97	2.15	3.93	3.73	2.29
Rural population							
World	1.79	2.55	3.21	3.26	3.19	1.17	-0.03
More developed regions	0.39	0.34	0.31	0.31	0.23	-0.43	-1.05
Less developed regions	1.40	2.21	2.90	2.95	2.96	1.46	0.06

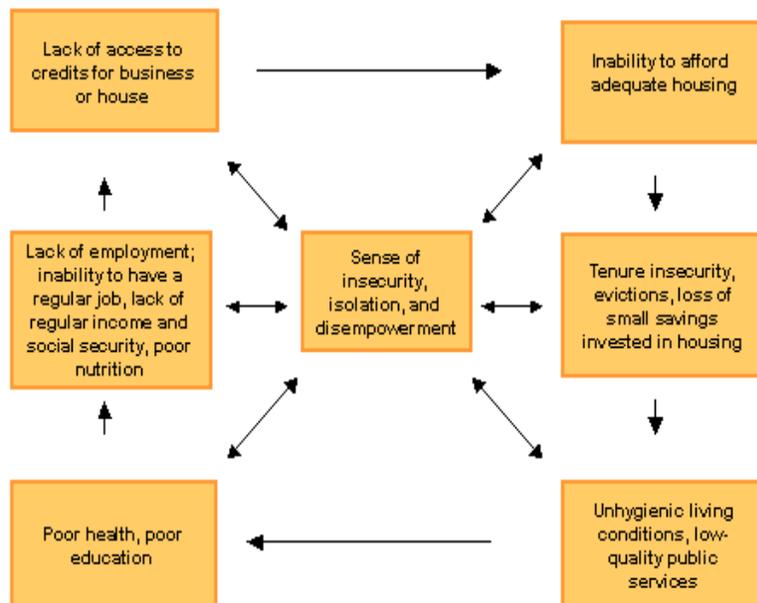
Source: UNPD, World Urbanization Prospects, 2003 revision.

1.2.2 POVERTY

It is estimated that from a total of approximately 3 billion people that live in urban areas, nearly 1 billion people are living in poverty (UN-HABITAT, 2004). There are however many different definitions of what poverty actually represents. In many cases these definitions are based upon income and physical necessities (creating poverty lines). There is also a tremendous variety of methods to measure poverty i.e. as a process or as a particular moment in time; absolute or relative etc. The Human Development Index (HDI) is a widely used method for measuring poverty. This index composes an effort to compile and compare the various aspects of poverty i.e. poverty in money, power, and access (UN, 2000). In most cases poverty is perceived as a condition in which people's livelihood capacity is inadequate to meet their basic needs (Black & Hall, 2003). Access to an adequate water supply is one of these basic needs. Recently, poverty definitions have extended to include social indicators. These alternative definitions of poverty mainly draw on risks and vulnerabilities as important aspects of poverty.

It is generally recognized that poverty is a dynamic concept. The World Bank (2006) has developed a dynamic framework in which the concept of urban poverty is characterized by various cumulative deprivations (see figure 1.1). Lack of access to housing and resources are just a few examples which are termed to be characteristics of poverty. One dimension of poverty, characterized by various deprivations, may be the cause of, or contributor to another dimension (World Bank, 2006). For example the inability to meet the expenses of adequate housing could cause or contribute to the lack of investments in basic services (for example water supplies), which in turn causes severe health threats, livelihood risks and insecurity.

Figure 1.1: Cumulative impact of deprivations.



Source: World Bank, 2006

An estimated 1/3 of the world's urban population does not have access to adequate housing. Nearly half of the urban populations in the developing countries live in urban slums and squatter areas (Vereecken, 1996). As mentioned above, each one of the elements characterizing poverty may contribute to, or cause another dimension of poverty. This also goes the other way around. This would mean that in case one of the elements characterizing poverty is being elevated; this could cause another dimension to be elevated as well. In due course, securing access to a safe water supply and adequate sanitation facilities could thus be seen as one of the many methods to alleviate poverty.

1.2.3 HOUSEHOLD WATER SUPPLIES IN URBAN AREAS

Due to the rapidly growing populations in the urban areas of developing countries it has become a serious dilemma for many households to obtain access to adequate basic services as for instance a sufficient safe water supply. The supplies often can not keep up with the demand and water resources are running short. Fast growing cities as Bangkok and Jakarta for example, are among the many Asian cities that have been facing serious problems with adequate water supplies for the reason that they have drawn too much water from their underground aquifers¹ (Satterthwaite, 1997).

¹ "An aquifer is a water-bearing stratum or formation capable of transmitting water in quantities sufficient to permit development" (Vriessman et al., 1993: 96)

Eventually the available water resources run out and alternative more expensive sources need to be explored. The number of people with a lack of access to sufficient safe water supplies at an affordable price is due to increase when there are severe constraints in the availability of water resources. In many urban areas however, the lack of access to sufficient safe water at an affordable price is not always caused by the above stated resource constraints. There are several other limitations causing households to lack access to a sufficient safe water supply e.g. household purchasing power, physical ability to collect water, pressure on the tap, lack of an infrastructure etc.

The lack of access to sufficient safe water at an affordable price can also have a more political economic background. This could, for example, be caused by a government's refusal to give a higher priority to water supply services, as well as the lack of a competent organizational structure for its supply, maintenance and expansion requirements (Hardoy et al. 1992). Many times the urban poor, who are considered to be most vulnerable as regards the access to adequate water supplies, are excluded from the official water supply services. In several cases the lack of access to official water services is the decision makers their indifference or even hostility against low-income families at local, national and international level (Solo, 1999). Solving these types of problems will require time as well as significant structural reorganisations.

Presently there are hundreds of millions of urban dwellers that have no alternative but to use contaminated water – or at least water whose quality is not guaranteed. Others pay extreme high prices to obtain access to clean water or make use of intermittent water supplies. The poor residents, living in the poor quarters of the city, are the first to suffer from inadequate or intermittent water supplies (McIntosh, 2003). They are the last in line to get piped water supplies. As recognized in the above stated figures the poor households generally reside in urban slums or squatter areas. The geographic location of these urban slums isn't favourable in reference to the services of piped water supplies. The slums are frequently located in the marginal areas of the city, where the installation of a water system often presents engineering problems (Anton, 1993).

The urban dwellers living in the urban slums and squatter areas often have no adequate housing or access to basic services. In many cases they simply can't afford to pay for adequate housing and basic services, or are not willing to invest time or money in improving their situation as regards housing and access to basic services. In particular the illegal status and the land tenure of the settlements have proven to be part of this problem. Many people have to live with the continuous threat of being evicted. The legalization of settlements has demonstrated that residents become more willing to invest time and money in improving their housing and basic services (Hardoy & Satterthwaite, 1989). In addition can the legalization make it easier for squatter to organize and demand proper access to basic services. Therefore, changing the land tenure of squatter settlements could be a solution to the problems many households have in obtaining access to an adequate safe water supply. There are however many other solutions to the issues as regards the access to adequate water supplies.

Calaguas and Roaf (2001) for example have identified four main common difficulties that have to be overcome by the poor urban communities to attain access water and sanitation services. These are:

- The legal position of the residents with respect to land tenure;
- The political position;
- The locality of the settlement in which the communities are living including the distance and accessibility due to narrow access roads;
- The cost (construction, operation, maintenance, serving etc.) of accessing services.

Securing adequate supplies of safe water for every household will remain one of the biggest challenges in the coming decades (Webb & Iskandarani, 1998). The importance of access to adequate safe water supplies has been recognized in the UN millennium development goals as well. In this document it is stated that they would like to halve the number of people that do not have access to sufficient safe water supplies by the year 2015 (UN, 2000 – goal nr. 7). There is a clear need to develop strategies to face this challenge in a sustainable, integrative and effective manner. The specific needs and vulnerabilities of the poor should stand central in the formulating of sound and equitable water strategies (McIntosh, 2003). In this thesis the concept of household water security is applied to explore the issues in reference to household access to available water supplies in more detail. The following chapter will take a closer look at this concept.

1.3 THE CONCEPT OF HOUSEHOLD WATER SECURITY

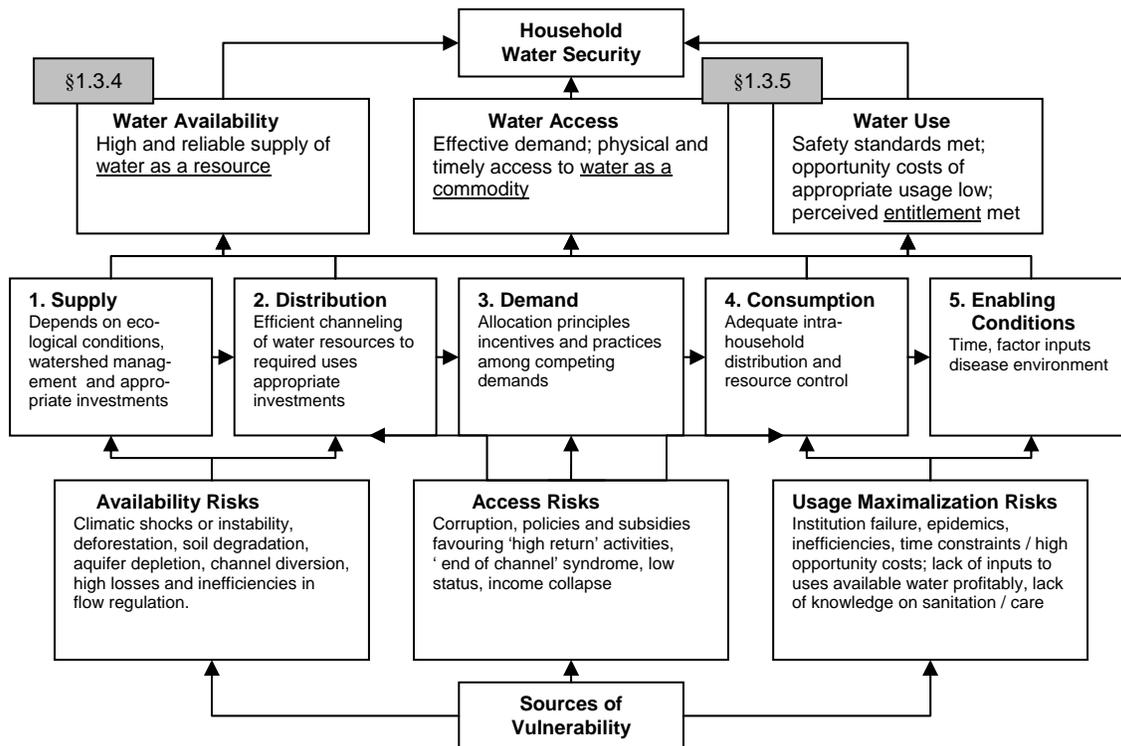
This paragraph will introduce the three principle elements that delineate the foundation of the conceptual framework of household water security. These three elements have operated as a guideline in the collection and analysis of data in this research. However, first the concept of household water security will need to be defined. Additionally there will be a short introduction of what constitutes as a sufficient and safe water supply, as cited in the concept of household water security. This is followed by four different contexts, which are identified as the most vulnerable groups that could become water insecure.

The first of the three principle elements in the conceptual framework of household water security, namely the availability of water, will be discussed in detail in the third part of this paragraph. In this part the focus is predominantly upon managing water as a resource. To finish this paragraph and chapter there will be a short review of the remaining basic elements of household water security i.e. access and use.

1.3.1 HOUSEHOLD WATER SECURITY

Household water security is a complex concept. In the first place the concept implies for every household to have access to an adequate safe water supply, reliably supplied to sustain a culturally normal life (WHO, 2002). Webb and Iskandarani define household water security as: “access by all individuals at all times to sufficient safe water for a healthy and productive life” (Webb & Iskandarani, 1998: 2). The concept of household water security has been thought-out by Webb and Iskandarani (1998) into a conceptual framework for a multidisciplinary approach in the analysis of problems in regard to water (see figure 1.2). The framework is made in reverence to the concept of food security. Household water security consists of three principle elements; availability, access and use (see also 1.3.4 & 1.3.5). These three principle elements, which are used as a guideline to examine the household access to water supplies in Bacolod City, are discussed in more detail in part four and five of this paragraph.

Figure 1.2: Conceptual framework of household water security.



Source: Webb & Iskandarani, 1998: 4

1.3.2 SUFFICIENT SAFE WATER FOR DOMESTIC USE²

There is a tremendous variance in what constitutes as an adequate amount of water. This variance is mainly caused by differences in climate, people and mode of life (Wescoat & White, 2003). In determining the “vital human needs”, attention ought to be paid to providing sufficient water to sustain human life. This includes both drinking water and water required for production of food in order to prevent starvation (UN, 1997). In addition water is used by the households for personal hygiene. The average domestic water consumption in European cities is estimated at approximately 130 l/c/d³. The actual consumption is an amount that is much higher than the essential amount of water required for consumption in European cities. For developing countries the suggested domestic water supply targets differ from 20 to 65 l/c/d (Rush, 2000).

In the major cities in Asia, an estimated 50 percent of the people use less than 40 l/c/d. For those households in Asian cities that are connected to piped water, the average water use is around the 200 l/c/d (McIntosh, 2004). There is a clear need for equitable distribution of water. McIntosh (2004) suggests that the average domestic consumption in Asian cities should be in the range of 100-150 l/c/d. This however is much higher than the suggested amount of water given by the World Health Organisation as well as various other authors. It should thus be noted that these figures are very much arbitrary. It can thus be concluded that there are no direct measurements for what constitutes as an adequate amount of water.

² Domestic water use is defined as the water used for direct consumption, the preparation of food and personal hygiene (Rush et al, 2000).

³ l/c/d – Litres per Capita per Day

Not only is there a need for access to an adequate amount of water, but the available water should also be of an acceptable quality, safe for a person's health. The safe water requirements often have more than simply one standard. Ultimately, water quality management should be just as important as water quantity management. Due to lack of knowledge by the researcher on the bacteriological and chemical quality of a water supply, these aspects will not be taken into account in this research. However, the importance of the water quality should not be ignored entirely. For that reason some alternative quality aspects were taken into account. These are the perceived water quality as well as the measures taken to ensure water quality.

The focus of this research, and the use of the concept of household water security in this thesis, will be primarily on the availability (regional and city level) and the access (local and household level) to water supplies. Securing sufficient safe water is very much context dependable. For that reason the following paragraph will review the context of the most vulnerable (as perceived by the authors that have developed the conceptual framework of household water security) before concluding with the availability and accessibility of sufficient safe water supplies.

1.3.3 THE CONTEXT OF THE MOST VULNERABLE

Freshwater is unevenly distributed. The constraints on water availability are thus not uniform across localities, nor across population groups (Webb & Iskandarani, 1998). Webb and Iskandarani (1998) have identified four different contexts for the most vulnerable groups and water insecure households in developing countries. Most households in these contexts are poor and the insecurity in the access to adequate water supplies is a major element in the interaction among poverty, malnutrition and resources degradation (Webb & Iskandarani, 1998: 16). The following contexts are identified:

- Dry marginal lands. Semi-arid rural areas typically far-removed from principal water supplies (as in the case of parts of north-western China and the Sahelian countries);
- Areas of high risk of drought or flood. These are places in which productivity potential is sometimes high (as in parts of Bangladesh or Brazil), but vulnerability to extreme weather phenomena generates high risks for water insecure households.
- Fragile watershed hillsides, that are major water sources but which tend to be 'upstream' of major benefit flows (as in the case of Laos and Vietnam); or
- Urban slums. Neighbourhoods bi-passed by most urban development.

The most important group in reference to the subject in this thesis is the contexts of the urban slums. The slums are in many cases located in the marginal areas of the city and they accommodate a high concentration of people that could become water insecure. The lack of a water supply system in these areas is often caused by fact that "putting water and sewerage lines into localities that were built without any basic utilities have proven to be difficult and expensive" (Knox & Marston, 2000: 481). Moreover, providing sufficient safe water supplies to these areas is often not a high priority of local governments.

There is already much accomplished in providing sufficient water supplies to urban areas in developing countries. However, there are still many urban households that until now do not yet have an access to an adequate supply of safe water. And, the number of urban residents without access to adequate water supplies and sanitation is still growing rapidly (UN, 2002). The focus of this research will be upon the context of the urban slums and the people living in the marginal areas of the city. However, first the three key elements of the conceptual framework of household water security need to be discussed in more detail. The following part will start off with the water availability issues.

1.3.4 WATER AVAILABILITY ISSUES

This part will explore the subject of water availability. The subject of water availability is one of the three key elements in the concept of household water security (see figure 1.2). The availability of water means a high and reliable supply of *water as a resource* (Webb & Iskandarani, 1998). “Freshwater is unevenly distributed geographically and temporally, resulting in a surplus for some people and a threat of severe water insecurity for others” (Webb & Iskandarani, 1998: 12). Water is a renewable resource as well, but even though there presently still is an abundance of available freshwater resources, there are signs that in a near future these are running short. Already unsustainable water withdrawal is gradually causing additional water shortages all over the world (UN, 2002).

Water, as a renewable resource, has the important characteristic that it can be used for more than one purpose (multi-tasking). The concept of water security is being used to describe the balance between the multi-purpose uses of water and the sustainability of resources at the household, community, regional and national/international level (Black & Hall, 2000). The first main focus of water availability in this paragraph and the research is for the most part on the larger regional and watershed level. The second main focus is on the access to available water supplies for households on the city and the local level.

Water availability is mainly dependent on the supply (1) and distribution (2) (see figure 1.2). The water supply (1) largely depends on ecological factors in the water cycle i.e. climate, soil, relief, vegetation etc. Adequate management of these ecological factors is important to secure an adequate present and future supply of freshwater resources. Presently the governments often play an important role in the management and protection of the available water resources. Recently attention is given to community empowerment and the role of civil society in the management of watersheds. New management approaches i.e. the Integrated Water Resource Management (IWRM) could help solve current problems related to the depletion of resources, deforestation, and the destruction of watersheds.

To ensure adequate water supplies, appropriate planning and management of the resources is very important. The traditional water resource planning and management were highly top down. In a reaction to the failure of traditional water resource planning and management there emerged a call for a more bottom up and integrated approach. This led to the construction of an Integrated Water Resource Management (IWRM) approach. IWRM can be defined as the incorporation and integration of the socio human factors, the economic issues and the ecological system in the management of water resources (Matondo, 2001). The concept of IWRM is seen to be a necessary condition for rectifying inequities regarding current water resource management (Black & Hall, 2003).

The recent developments in thinking with reference to the planning and management of water supplies recognize watersheds as a major element of an integrated approach to the management of water resources. In the IWRM approach additional attention is given to the watersheds residents and environment (Sheng, 2001). Watersheds entail principal sources of water which encompass a delicate balanced system. These areas include both water supply and distribution systems. Appropriate management of the watershed highly influences the long- and short term availability of sufficient water resources in upper as well as downstream areas (for example a city or village). Presently, the main focal points of development projects as regards the IWRM are predominantly on the upper catchments areas of watershed as well as community empowerment in these areas via decentralization.

In addition to the supply (1) there is the actual distribution (2) of water, which is important for securing the availability of a sufficient safe water supply (see figure 1.2). Water has to be distributed to the point where it is made functional to human and ecological activities. In many cases it is not the availability of water resources, but problems related to the allocation of water resources which are the reasons for existing water shortages. The distribution of water supplies is also of influence to the household access. Efficient channelling of water, appropriate investments and minimizing losses are the key challenges as regards to the subject of distribution (Webb & Iskandarani, 1998). It is thought that a lack of investment or political attention is causing most of the inefficiencies regarding the distribution of water. In this research attention will be given to the problems related to the distribution of water by public as well as private institutions to the households in urban areas.

It is thought that privatization, or a mixture of the public and private sector in infrastructure can help solve the problems that public authorities have in providing adequate basic utility services i.e. the distribution. In regard to the delivery of infrastructure services, the World Bank claims that the roles of the public (government) and private sector must be transformed. "Governments will however have a continuing, if changed, role in infrastructure" (World Bank, 1994: 395).

To ensure sufficient, responsive delivery of infrastructure services, the World Bank proposes three main alternatives according to the following principles:

- Manage infrastructure like a business, not a bureaucracy
- Introduce competition – directly if feasible, indirectly if not
- Give users and other stakeholders a strong voice and real responsibility

The world development report of the World Bank (WB) focuses primarily upon economic infrastructure⁴. It is important to recognize that water supply is only a component of the economic infrastructure. Managers of water supply infrastructures could use the by the World Bank proposed principles as a guideline. Other statements regarding economic infrastructure in the world development report of 1994 are that infrastructure should deliver major benefits in economic growth, poverty alleviation and environmental sustainability as well as a public-private partnership in financing.

In the debate concerning the public-private partnership in water supplies, the role of the small scale private sector should not be overlooked. When implemented properly, the introduction of public-private partnership has shown to relieve budget constraints and improve supply efficiency (Engel et al 2005). This in turn would benefit the households, especially the poor, which then could receive water supplies via the formal water supply systems.

There are however serious opponents of the liberalization and privatization of economic infrastructure in for example the water supplies. A United Nations rapport that examined the impact of infrastructure privatization upon the poor in Latin America concludes that: "privatization generally failed to take the interests of the poor into account with regard to affordability of services and access to connections. For the poor households the affordability of connection to the piped network is often a greater obstacle than the affordability of the water consumed" (UN, 2004: 1). The water supply system in Manila is one of the examples in which a public-private partnership in the water supply sector has led to public criticism (see box 1.2).

⁴ Economic infrastructure – includes services from: public utilities, public works and other transport sectors. Infrastructure is an umbrella term for many activities referred to as 'social overhead capital'.

Box 1.2: Privatization fails to plug the water woes.

Filipino homemaker Erlinda wakes up at five each morning to wait for her family's daily ration of water. That is because her faucet runs dry after half an hour, barely filling up a water tank that she had installed years ago to store what has become a precious resource. With four grown children in her household, the water she saves is still not enough. She buys water from a supplier every week, pushing her monthly water bill to P2,500 (US\$47). This does not include the distilled drinking water she has to buy — what comes out from her perennially dry faucet is not potable.

'It's exasperating,' she says of her daily ordeal for the last 25 years. It is a burden made heavier by the fact that her family lives in an upper-middle class subdivision in Parañaque, south of Manila, which ideally should not have to worry about water. "Why can't we even have this simplest basic necessity at all times and at reasonable cost?" she asks. Her sister, she points out, lives in a plush condominium in central Manila and enjoys uninterrupted water supply for only P200 (US\$3.70) a month. "I don't understand it," she says.

Over in the slums of San Andres, also in Manila, Simeon is thankful that he has running water. But his water bill keeps getting higher, rising to P500 (US\$9.4) a month from US\$3.7 in 1998. Why the inequality in water supply and water costs? This is what many have been asking recently, following another wave of water price hike this month in Metro Manila, a mega city of 10 million people.

The question has become more nagging given the fact that in 1997, under the World Bank's advice, the Philippine government privatized the government-owned Metropolitan Waterworks and Sewerage System or MWSS to reduce the cost of water, improve service, and expand connections to waterless areas. Metro Manila was divided into two zones, each run by a concessionaire to encourage competition. The contracts were awarded to two oligarch families — the Ayalas and the Lopezes, each with major international water companies as partners.

The Ayala and International Water consortium runs the East Zone concession called Manila Water Co Inc., and the Lopez and Lyonnaise des Eaux's Maynilad Water Services, Inc. runs the West Zone area. Five years after the privatization that was expected to improve water services, consumers' and activist groups say, Manila's water crisis has only become worse. Water prices have not gone down but up, even as private concessionaries failed to comply with the expansion and service targets they set in their contracts.

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By Marites Sison, Manila Times, Saturday, January 25, 2003

The two subjects of water supply (1) and distribution (2) are significant in this research as they affect the access to sufficient safe water supplies i.e. the availability of water on a household level. In the first place there is the need to manage and plan water resources to ensure that there is a sufficient amount of safe water resources that are, and stay available. Secondly the water needs to be distributed to the point of use, which is the household. In this research specific attention is given to the quality and access to water supply services, as well as the cooperation of the public and private sector as regards the water supplies. In both cases the households and civil society can play a significant role in management and planning of available water supplies. The next part of this paragraph will discuss the additional two key elements in household water security i.e. access and use of water supplies, in more detail.

1.3.5 ACCESS AND USE

In the previous paragraph, in which water availability is discussed, attention is given to the scarcity and stress of water as a resource. Although many improvements can be made in reference to securing sufficient safe water resources, in the long run local constraints will force people to look at alternative solutions to solve their lack of access to water supplies. Given the geographic and temporal scarcities of water as a resource, recent developments show an increasing attention for improving household's access and use of water supplies (Webb & Iskandarani, 1998). This part of the paragraph will focus upon these two key elements in the concept of household water security.

The access to a water supply is partly determined by the effective demand (3), the consumption (4) and the distribution (2) of water i.e. the allocation of water resources (see figure 1.2). Standards regarding adequate access to water demonstrate large differences. The United Nations and the WHO state that a minimally acceptable access to water supplies consists of having a source of abundant safe drinking water within 200 meters (UN, 2000). This standard implies that standpipes and outside water connection can be part of the solution, especially in high density build areas with a populace that generally has a low income (UN, 2002). In other cases, for example asserted by several governments, access to a sufficient safe water supply is the existence of a water tap within 100 meter of a house (Knox & Marston, 2000). Most of the standards are based upon a physical and timely access to a water sources. These standards however do not always guarantee that a household can secure sufficient safe water to maintain good health.

Improved access to a water supply has various other benefits other than maintaining a healthy lifestyle. In the first place there is the convenience of having an easy accessible water supply. Then there is the money, time and energy saved by the improved access to a water supply (Ramalingaswami, 1997). These aspects are of significant importance for the urban poor households. The poor households however frequently have to pay extreme high prices, spend much time on collecting water and have to put a lot of effort in gaining access to the available water supplies (see also paragraph 1.2.3). Additionally the access to a reliable, safe and affordable water supply has a direct impact on the livelihoods and incomes of the urban poor (Calaguas & Roaf, 2001). In this research, specific attention will be given to the poor households in urban areas and their efforts to secure access to sufficient safe water supplies as well as their willingness and ability to pay for improved water supplies.

In addition to securing access to sufficient safe water supplies it is important to focus upon the actual consumption or use of a water supply. In this key element of the conceptual framework of household water security the focus is upon water as an entitlement. Water use mainly depends on the actual consumption (4) and the enabling conditions (5) (see figure 1.2). The consumption of sufficient water according to the need is very important. The quality of water is very important for maintaining a healthy household as well (see also paragraph 1.3.2). Another important aspect in the adequacy of water usage is encouraging appropriate consumption and ensuring appropriate disposal after use. Knowledge on hygiene, sanitation, water consumption and disease control therefore are key elements in household water security (Webb & Iskandarani, 1998). As a last aspect of the water usage it is important to denote the gender constraints i.e. opportunity costs. Women are often the main users of water supplies, and they spend a great deal of time collecting water. This is in itself a restriction for the amount of water that can be used (Webb & Iskandarani, 1998). In this research the issue of gender is however not explored in detail. The focus of this research is mainly upon the perceived quality and the knowledge on adequate usage of the available water supplies.

This research is reviewing the two elements of access and use in case study areas by means of a household level survey. It is particularly important to know how water insecure households themselves perceive their own conditions and potential solutions (Webb & Iskandarani, 1998). Knowledge on these issues can provide a basis for sound decision making. In this thesis the water supply i.e. the availability of water resources and distribution will mainly be assessed on the local, regional and city level. The two elements of access and use of water supplies are examined on the household level, to make an initial assessment of the perceptions of households and their potential solutions as regards access to adequate water supplies in Bacolod City.

1.4 RESEARCH QUESTIONS AND OBJECTIVES

This research is an exploration and description of the availability, accessibility and use of water supplies in the city of Bacolod. The first main objective of this research is to gain insight in the management of the available water resources as well as the distribution of water i.e. the available water supplies in Bacolod City. Special attention is given to the roles of the public and the private sector in securing the availability of these water supplies. At present there is little or no knowledge on the household perceptions on and access to the available water supplies in Bacolod City. The second objective is therefore to explore the households' access and use of these available water supplies. Along the lines of these objectives, the following main question has been formulated:

By what means do households in Bacolod City secure access to a sufficient safe water supply?

The goal is thus to explore and describe the access to available water supplies by households in Bacolod City. Special attention will be given to the perception and behaviour of the residents of squatter areas on the subject of access to adequate water supplies. The main issue will be the spatial differences in the access to available water supplies in and between squatter areas. This issue has been explored by way of several case studies. The research should eventually lead to a better understanding of the household water demand and supply over space and time as a basis for decision making. To answer the main question as well as to pursue the objectives and goals of this research, the following sub-questions are formulated:

1. *What are the roles of the public and the private sector in securing the availability of a sufficient safe water supply by the households in Bacolod City?*
2. *Does the public sector in Bacolod City encounter any problems in securing the availability of a sufficient safe water supply by the households?*
3. *Are there any problems in the access to and eventual use of the available water supplies as perceived by the researcher and the resident in the squatter areas of Bacolod City?*
4. *Are there any spatial differences in the access to sufficient safe drinking water supplies by the households within and between squatter areas in Bacolod City? And if there are spatial differences in access to potable water supplies, what is the nature of the main differences?*
5. *How can the main problems related to the availability and access to a sufficient safe water supply in Bacolod City be improved?*

1.5 METHODOLOGY

The research started with the gathering of secondary data by reading relevant literature. From this literature the subject of household water security was extracted and further studied. This eventually led to the formulation of the initial research objectives in a research proposal. Leading from these objectives, the research questions have been assembled. At this point it became clear that the research would be mainly explorative and descriptive in nature.

The initial and the final phase of the research could be completed in Netherlands, but the actual primary data collection in between these two phases had to take place in the eventual setting of the research. The setting of the research was Bacolod City, the Philippines. The first part of this paragraph will give a short review of the collection of primary data. After describing the selection of the case study areas and the selection of the households in part two and three in this paragraph, the methods applied in this research will be discussed i.e. the questionnaire, conversing and the focus group discussion. The last paragraph of this chapter will outline the operational definitions.

1.5.1 COLLECTION OF PRIMARY DATA

Following the research objectives and the eventual need for collecting primary data it was necessary to make a choice as regards the setting of the study. After a couple of introducing e-mails with Cezar Villanueva, then president of the Community Based Organisation (CBO) Balayan at La Salle University, Bacolod City, it was decided to conduct the research in Bacolod City, the Philippines. Eventually this resulted in a five months stay in Bacolod. In this short period of time the primary data was collected.

Before initiating the actual research it was important to get familiar with the city and learn how to get around. After familiarizing with the city there was a short introduction with the staff of the Balayan and the staff of the host university St. La Salle in Bacolod City. Soon after these introductions the actual data collection could be initiated. The research started by way of several meetings and interviews with key-figures. The first key-figures were engineers at the public water supply utility in the city i.e. the BACIWA⁵. Other key-figures from the City Planning office, the City Engineers (CE) as well as the Department of Public Works and Highways (DPWH) were interviewed. These interviews provided additional insight on the management and planning of the water supplies in Bacolod City.

The key-figures at the Bacolod City planning office, the BACIWA, CE and the DPWH provided various relevant reports (as for example the feasibility study on the expansion/improvement of Bacolod City Water District, the SEP⁶, and the BDP⁷ etc). These reports contained vital information on the current situation as regards to the water supplies on the city level. This eventually helped revise and finalize the research questions.

With reference to the research questions, and in particular the household access and use of water, there was the necessity to acquire information via household interviews. Preparations for the fieldwork were made, and an interpreter was selected. A questionnaire was constructed with relevant question on the availability, access and use of water on the household level. The questionnaire was primarily based upon several assumptions on the characteristic of the survey areas. The following part of this paragraph will provide more detailed information on the selection of case study areas and households, as well as the questionnaire and focus group discussion.

⁵ Bacolod City Water Authority or the Bacolod City Water District

⁶ SEP – Socio Economic Profile Bacolod City

⁷ BDP – Barangay Development Plan

1.5.2 SELECTION OF THE CASE STUDY AREAS

A number of determinants were formulated to select the areas used for the survey. These determinants were based upon the questionnaire. The questions in the questionnaire were primarily founded upon the assumption that the households would not have access to the official water supply system. After interviews with representatives of the local water district (the BACIWA), it became clear that large parts of the city did not have access to these services. Based upon this information several areas were visited. Eventually two distinct areas needed to be selected. At least one area was to be outside the service area of the local water district, and another area within the service area. The choice to select an area that was within the service area was made in order to explore the actual use of the official water supplies, or ability to connect to water supply services from the BACIWA by households in a squatter area. However, a case study area outside the service area was the main objective.

The first selection of an area for the survey was made in regard to the information provided by the BACIWA. This information was founded upon the political unit of a barangay⁸. That is why the first selection for case study areas was based upon the barangay unit. The first barangay selected was barangay Punta Taytay (see figure 1.4). This selection was made upon the fact that this barangay is located outside the service area of the BACIWA. Other elements which played a significant part in the selection of this barangay were the present problems as regards the availability of water supplies. The geographic location of the barangay i.e. in the urban fringe, was also of significance of the eventual choice.

The second barangay selected was barangay Bata. This barangay is also located outside the service area of the BACIWA (see figure 1.4). The main difference with barangay Punta Taytay is that, barangay Punta Taytay is situated in the coastal areas, while barangay Bata is located more inland. The last selected area was barangay 7 (see figure 1.4). This is a typical urban barangay located within the service area of the BACIWA. The barangay was also very near to the University complex and therefore could be used for a short, last minute survey. This barangay was chosen primarily because there was only limited time for implementing a survey in the last case study area. The aspect of time was thus an important factor in the choice of the case study areas as well.

The focus of the survey would be mainly upon the urban poor households. This has led to the selection of the areas with primarily urban poor residents. In order to select areas where mainly urban poor households would be located, several interviews with barangay captains, local leaders, and purok presidents have been performed. These individuals were able to point out the areas with high concentrations of urban poor households. The areas with high concentrations of urban poor households were primarily squatter settlements. At this point the choice was made to focus upon the squatter settlements.

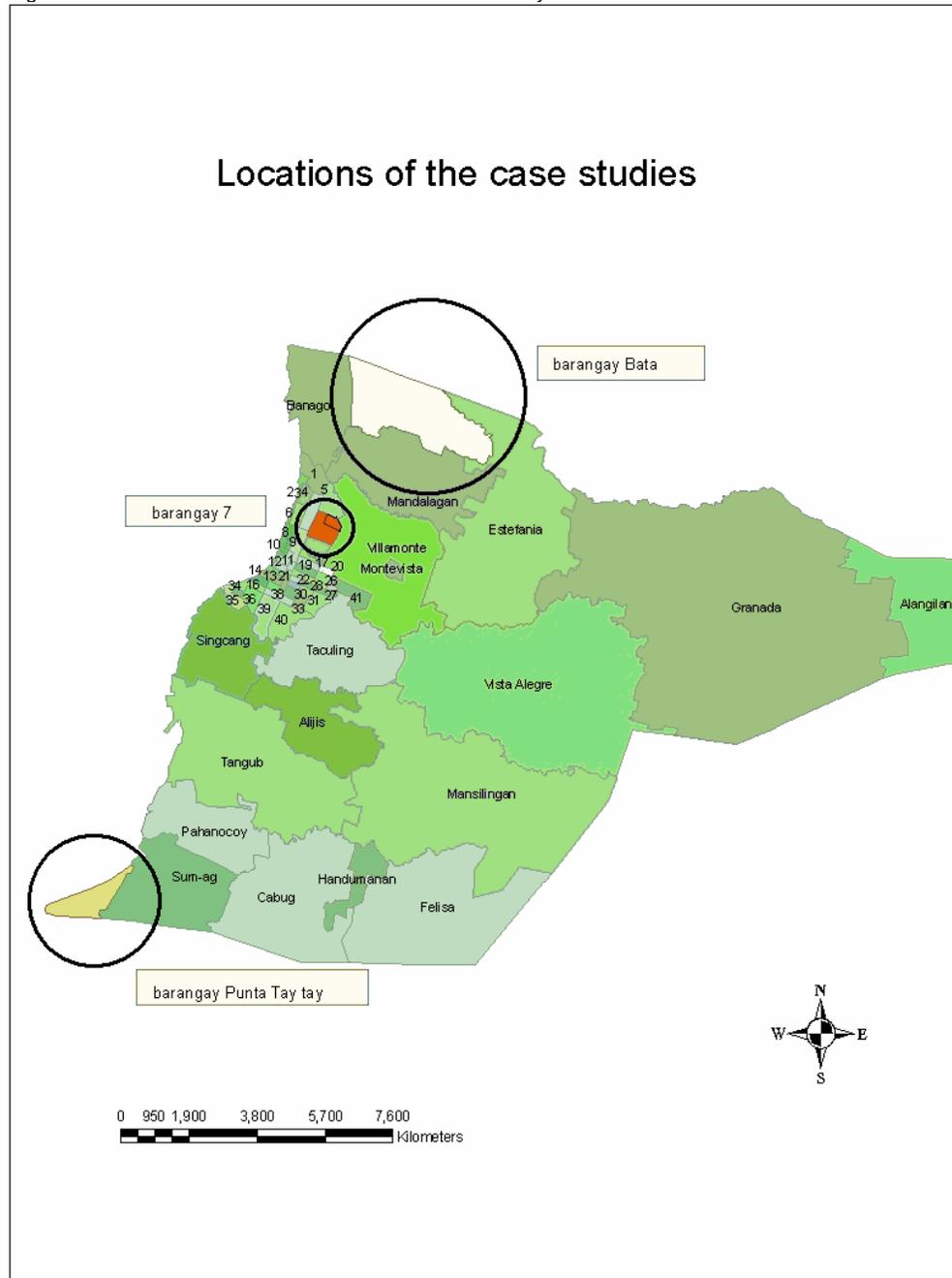
Most of these squatter areas were conform the geographic boundaries of the puroks⁹. In order to construct boundaries for the case study areas, the geographic boundary of a purok seemed the most logic choice. Selecting the puroks which eventually would be used as case study areas within the selected barangays was not a problem. Most informants, in particular the barangay captains, were very helpful in pointing out the puroks in which many squatters recided. It needs to be noted however that the residents of the selected puroks are not a homogenous group, and thus can not be considered as such.

⁸ A geographic area similar to a neighborhood. A barangay is the smallest political unit in the country.

⁹ A geographic area located within the barangay. A barangay consists of several puroks (neighborhood organizations).

In barangay Punta Taytay three different purok were selected. The selection of these three different puroks in this barangay was made to gain insight on the different situations within the barangay. Another motivation was to explore the situation in reference to the water supplies thoroughly as well as acquire experience with performing household interviews (see paragraph 1.5.4). In the other barangays only one purok, or in the case of barangay Bata two adjoining puroks that were difficult to keep apart, have been selected. The data gathered in the five puroks is not comprehensive and cannot be considered as valid for the barangay or Bacolod City as a whole, nor for squatter settlements within the city.

Figure 1.3: Location of the case studies within Bacolod City.



Source: The author, with ArcGIS files from the Planning Office Bacolod City.

*note: There is no legend added to this map, as the figures in the GIS-files, which were related to the spatial data, did not match with the figures specified by the NSO and the city government. A random colour scheme is applied.

1.5.3 SELECTION OF THE HOUSEHOLD

The research unit for the descriptive case studies was the household. Because of the limited time for implementing the survey, a target was set on a minimum of 100 households. To make sure that every household had an equal probability of being chosen, the households were selected by means of a simple random sampling. Eventually a total of 120 households were interviewed. A sample size of 60 households was selected in barangay Punta Taytay (20 households per purok) and in both the selected puroks within barangay 7 and Bata 30 households were interviewed.

After selecting the puroks, a detailed map of the barangay was obtained. Because a detailed map of the puroks was not available at first hand, an abstract map of the puroks was sketched by using the barangay map and several visual landmarks. In the selected puroks the households were pretty much scattered disorderly over the area. There was only a rough indication of the number of households available in most of the puroks. At this point it became clear that a random sample and similar sample size of the households would be difficult to obtain.

To select the households that would be interviewed for the survey approximately 20 to 30 dots were placed randomly on the sketched map. In the field the households most nearest to the dots have been visited and interviewed. In the case of non-response (i.e. not home, not available, no head of the household present), an appointment was made for a return later or the household second nearest to the location on the drawn map was selected. More information on the relative sample size is available in chapter four.

1.5.4 THE QUESTIONNAIRE, CONVERSING AND FOCUS GROUP DISCUSSION

In a very short period of time a questionnaire was constructed. The use of a questionnaire was needed to explore the behaviour, attitudes and opinions as well as awareness on specific issues as regards the water supplies (Flowerdew, 1997). A pilot was conducted in a random purok in barangay Punta Taytay i.e. purok Mabi-abihon. This purok had somewhat similar characteristics as the already selected puroks. According to the results of the pilot, several corrections in the questionnaire were made. A number of question were deleted, others were adjusted or altered completely. The questionnaire was not translated into Ilongo, the local dialect in Bacolod City. This decision has been made intentionally. The questions were simply formulated in English, and during the pilot most people had no real problems in answering the questions in English.

All 120 face to face interviews were implemented during the morning and early afternoon. The head of the household was taken as the representative for the household unit. However, any available adult household member that claimed he or she was the household representative, and was willing to answer the questions, was suitable to act as a respondent. This did lead to some problems, which in most cases could be solved after the first set of questions was answered. If the person was not an adult (>18) or did not live in the house that was approached, a new appointment was made, the research would be continued at the next housing unit or another household member was asked to answer the questions.

Problems in reference to non-response have not occurred to a notable extent. There were some respondents that have not been able to answer questions at the time of visit, however in most cases the second visit that was arranged did result in an interview. In only 3 cases the housing unit next to the intended housing unit was chosen in a case of non-response. Nonetheless, response errors have clearly not been anticipated upon completely.

In some cases the questions may not have been understood the way intended, or the respondents felt pressured or intimidated by the researcher. At a particular time in one of the survey area of Punta Taytay, there was even the assumption that the researcher was an employee of the local water utility system (the Bacolod City Water District - BACIWA). Although it was clearly stated the researcher was not a representative of the BACIWA, this gossip may have influenced the manner various households have answered to the questions.

A large part of the information gathered by the questionnaire would eventually be gained by the more informal method of conversations following the questions asked in the questionnaire. For this part an interpreter was needed. An interpreter was appointed to ensure that the communication between the interviewer and the representative of the household (in this case the head of the household) was most favourable. The interpreter was very helpful, in particular at moments in which the interviewee was trying to explain a difficult situation. In many cases, explaining these situations in English turned out to be a problem for the respondent. In almost all cases (with a few exceptions of people that did not have much time), the conversations resulting from the questions in the questionnaire have been of great significance. These conversations led to a better understanding of the situation as regards the access and use of water supplies by the households in the research areas as well as in Bacolod City.

In addition to the questionnaires and the key informant interviews there was a focus group discussion conducted with the Barangay Health Workers (BHW) of barangay Punta Taytay. The BHW were chosen as members for a focus group discussion because these women are often directly involved with the use and access of the water supplies in the barangay as well as in the research areas. The focus group discussion was performed after all the questionnaires in the survey areas were finished. This research method was used as to collect additional information and to confirm the information already gathered by the questionnaire.

Because of the lack of time it was unfortunately only possible to perform a focus group discussion in barangay Punta Taytay. There was no time to perform a focus group discussion in purok Magnolia or Sawmill. However, there have been some meetings and conversations with the BHW's of these barangays. In these meetings information on the household water supplies within the barangay and the puroks was gathered.

1.6 OPERATIONAL DEFINITIONS

Several principle operational definitions that have been used in the research will be determined in more detail. This could improve to the understanding of the research and the developments that have taken place within the research.

WATER SUPPLY:

As part of a system: Water supply is mainly the process or activity by which water is provided for a specific use, i.e. domestic, industrial, agricultural etc. (Merrett, 1997).

As part of a key element in the Household Water Security framework i.e. the availability: The water resources available for a community or a region is the water supply. The supply of water mainly depends on ecological systems and is often unevenly distributed over space and time (Iskandarani, 2001: 7).

WATER SUPPLY SYSTEM:

Also known as waterworks. A water supply system is a system that withdraws water from resources, and often treats water to distribute it to the locations that need it. (Anton, 1993)

HOUSEHOLD:

An aggregate of persons, generally but not necessarily bound by ties of kinship, who live together under the same roof and eat together or share in common the household food. Members comprise the head of the household, relatives living with him/her and other persons who share the community life for reasons of work or other consideration (NSO, 2004).

The focus of research is mainly upon the place of the housing unit in regard to their water supply. A housing unit may contain several households sharing the available water resources. In this thesis the definition of a household is therefore extended to the members in a housing unit sharing the available water supplies.

SQUATTER SETTLEMENT OR SQUATTERS:

Squatters are urban residents that are living on land that is not their property (UN-HABITAT, 2003). The squatters often live in densely populated areas where there are no proper basic services available i.e. piped water supplies.

BARANGAY:

A barangay is a Filipino term. It is a geographic area similar to a neighbourhood. A barangay is the smallest political unit in the country.

PUROK:

This is also a Filipino term. A purok is a smaller geographic area located within the barangay. A barangay consists of several puroks (neighbourhood organizations).

WATERSHED:

A watershed, also referred to as catchments area, refers to an area that supplies water by surface or subsurface flows to a given drainage system, be it a stream, river or lake. The watershed is thus viewed both as a water supply and distribution system, with finite water resources made available to various users (for primary production, domestic and industrial consumption, transportation, or power generation) (Francisco, 2002).

1.6.1 CONCLUSION

This chapter has introduced the basic theories, objectives, research questions and the methods used in the research. The conceptual framework of household water security, which is described in the previous chapter, has been used as a guideline for the collection and analysis of data in this research. As mentioned above, the element of water availability will mainly focus upon the larger regional, as well as the city level.

The elements of access and use of water supplies is explored on a more local and household level. The next chapter will first introduce the setting of the research. In the third chapter the availability of water on the national, regional and city level will be explored. The access and use of water on a local and household level will be dealt with in chapter four. The fifth chapter will analyze the data, and the sixth and concluding chapter will try to answer the questions and provide recommendations for improvements in household access to adequate water supplies in Bacolod City.

2 THE SETTING

This chapter will introduce the setting of the study. The first paragraph will deal with the basic geographical settings of the Philippines. In the second paragraph the contexts of the province and city are introduced. The last paragraph will contain short descriptions of the barangays and puroks in which the household survey has been performed.

"The Philippines is in a strategic position. It is both East and West, right and left, rich and poor. We are neither here nor there."

- Imelda Marcos, cited in Ang Katipunan, February 1982

2.1 INTRODUCTION

This chapter is an introduction to the context in which the research is carried out. As mentioned in the previous chapter the research is performed in Bacolod City in the Philippines. The Philippines is a unique country situated in the heart of south-eastern Asia. The first paragraph of this chapter will outline the basic geographic characteristics (location, rainfall, climate, people etc), as well as data regarding the subject of this thesis on a national level i.e. urban poverty and water supplies in the Philippines.

In the second paragraph of this chapter, the province in which Bacolod City is situated is introduced. After outlining basic geographic characteristics and the economic position, several figures in regard to poverty in the province are presented. Following the more general introduction of these larger scale settings, the context of the regional and local level i.e. the city, barangay and purok are specified. In paragraph three the basic geographic characteristics, as well as data on population growth, the economy, water supply and sanitation of Bacolod City is outlined. The barangays and puroks that were used in the case studies are described in paragraph six. These descriptions are mainly meant to give an impression of the current conditions, in which the households in the research areas are situated. Only a small introduction on the subject of household water supply is presented in this chapter, since the following chapters will offer a more detailed description on the water supply on a national, city, local and household level.

2.2 BASIC GEOGRAPHIC CHARACTERISTICS OF THE PHILIPPINES.

Situated in South-eastern Asia, enclosed by the Philippine Sea in the east and the South China Sea in the west, lays the Philippines archipelago (for a detailed map of the Philippines see Appendix 1). The Philippines archipelago contains around 7,107 islands on a total area of 300,000 sq km (nearly 8 times the size of the Netherlands) and a coastline of 36,289 sq km. The Philippines can be geographically divided into three regions. In the North is the Island of Luzon, in which the capital city Manila is situated. Luzon is the largest island in the Philippine archipelago. The second largest island and the second geographical region of the Philippines is the island of Mindanao in the South. The third region is the Visayas, a group of islands situated in the centre of the Philippines. This research has been conducted on the island of Negros, which is one of the many islands located in the Visayas. Politically the country is divided into 16 regions, 79 provinces and 116 chartered cities. These in turn are subdivided into municipalities, barangays and eventually at the smallest level into puroks.

The Philippines has a primarily tropical marine climate, with a northeast monsoon from November to April, and a southwest monsoon from May to October. There is a uniform temperature (27°C average throughout the year) with a relative humidity (70 percent) throughout the year (FAO, 2003). The archipelago is situated in a typhoon belt, and therefore frequently affected by typhoons and five to six cyclonic storms per annum.

Other natural hazards are landslides, several active volcanoes and destructive earthquakes, as well as the possibility of a tsunami. Presently the uncontrolled deforestation has led to an increase of chance on landslides and floods. In the urban areas there are several large environmental issues i.e. air and water pollution (CIA, 2005). The terrain of the Philippines consists of predominately mountains, with narrow to extensive coastal lowlands. The highest point of the Philippines is mount Apo at 2,954 m, on the island of Mindanao near the city of Davao. The mountain ranges are generally along the north-south axis across the paths of important air streams. These ranges highly affect regional rainfall patterns. The average annual rainfall is estimated at 2,373 mm/year, with variations from 961 mm in southeast Mindanao to more than 4,051 mm in central Luzon (FAO, 2003). The lowest average rainfall occurs in the provinces of Cebu, Bohol and Cotabato in the centre of the country.

2.2.1 THE PEOPLE

After more than 300 years of colonization by the Spanish (1565-1898) and nearly 50 years of colonization by the Americans (1898-1946), the people in the Philippines eventually were able to claim their independence in 1946. The colonization of both the Spaniards and the Americans however has left an apparent mark on Philippine society. Today, over 87 million Filipino's make a colourful mix of Malay, Chinese, Spanish and Polynesian (est. 2005). The Philippines is a densely populated country. Recent figures show that the average Philippine household size is estimated at 5.1 persons. According to the National Statistics Office (NSO), the population density as of May 2000 was roughly 255 persons/sq. km. And the population is growing rapidly, with a rate of more than 1.8 percent per annum.

Approximately 15 percent of the total population lives in Southern Tagalog, or Region IV. An additional 13 percent lives in the National Capital Area, and approximately 11 percent in Central Luzon, or Region III (NSO, 2002). The other 61 percent is distributed over 13 regions (see Appendix 1). In the Philippines there are two official spoken languages i.e. Filipino (based upon Tagalog) and English. There are eight major dialects which are Tagalog, Cebuano, Ilocan, Hiligaynon or Ilonggo, Bicol, Waray, Pampango and Pangasinense. Roman Catholic is clearly the dominant religion in the country with approximately 83 percent of the population being Roman Catholic. Other larger religious groups are Protestants and Muslims.

2.2.2 POVERTY

Poverty is a widespread phenomenon in the Philippines. Around 40 percent of the total population lives below the poverty line (CIA, 2004). The National Statistics Office (NSO) in the Philippines measures the poverty incidence by the income approach, creating a poverty line. This poverty line forms a threshold which represents the minimum income necessary to meet basic food and non-food requirements for an average sized Filipino household. The official national threshold given for the year 2002 was set at an income of 11,906 php a month (this figure differs per region). Following this threshold, the poverty among Philippine families was only 24.7 percent (NSO, 2003). According to the National Statistics Coordination Board (NSCB) has poverty among Filipino families declined in the year 2003. Though given the high annual population growth rate, the increasing unemployment rate and the unequal distribution of income, it has proven to be increasingly difficult to alleviate poverty.

2.2.3 URBANIZATION

The population in the Philippines is highly concentrated in several large urban areas. The transition to an urban country was made in 1992, when an estimated 52 percent was living in cities and towns (Racelis, 2000).

At present roughly 48 percent of the total population lives in large urban areas (NSO, 2000). In many of these urban areas, poverty is prevailing. In the urban areas of the Philippines economic inequality is much higher than in the rural areas, and this inequality is increasing. However, it is estimated that urban poverty in the Philippines is still much lower than rural poverty. The focus of the thesis will be predominantly upon the subject of urban poverty. The intra urban economic inequality mentioned above is measured by the access to basic services, status across housing, land tenure, water and sanitation, and transport (World Bank, 2000). The increasing numbers of people in the city creating new demands on a city's services, which in turn can generate hardship for many urban residents.

2.2.4 URBAN POVERTY

The majority of the urban poor people live in large squatter areas. In many Asian cities the squatter areas are highly popularized because of their low costs of living. These squatter areas are mainly characterized as informal, illegal or semi illegal housing areas out off the city centre. A squatter settlement is defined as spontaneous or marginal "self help" or "self built" housing, or housing that has no title to the land it is built on (UN-HABITAT, 2003). Many poor Philippine people have no choice but to live in one of the many urban squatter areas. These urban poor often have to live in degraded neighbourhood environments, have inadequate or low quality social services and with the greatest threat of all, eviction (Racelis, 2000). The land tenure and several other constraints can be the cause of the lack of access to basic services, e.g. adequate safe water supply and sanitation in these areas. In many cases the lack of access to these basic services is still a widespread problem for the households living in the squatter areas of Philippine cities.

2.2.5 WATER SUPPLY

Obtaining access to adequate water supplies is a daily problem for many Philippine families. Large urban areas are not covered by the official water supplies. As a result, many households do not have access to clean piped water. It is estimated that only 50 percent of the total households in the Philippines have access to their own or shared faucet. Another large percentage of households i.e. 31 percent has their own or shared piped tube well (NSO, 2002). The remaining 20 percent are forced to use dug wells, springs, rivers or streams, rainwater or buy water from peddlers to secure their daily supply of potable water (see table 2.1). In particular the urban poor suffer from the lack of access to a basic supply of safe drinking water. They are forced to use water of uncertain quality or pay extensive high prices for water from peddlers. Securing a sufficient safe supply of water and reaching these urban poor households remains an immense challenge for urban policy makers in the Philippines.

Table 2.1: Families by main source of water supply by income stratum, urban-rural residence in the Philippines.

Income stratum	Own Use Faucet	Shared Faucet	Own use Tubed/Piped Well	Shared Tubed/Piped Well	Dug Well	Spring, River, Stream	Rain	Peddler	Other Souces
Philippines	32.6	16.5	13.3	17.6	9.4	6.1	0.4	3.6	0.5
Lowest 40%	12.1	22.6	10.2	25.3	15.5	11.4	0.6	1.9	0.5
Highest 60%	46.3	12.4	15.4	12.5	5.3	2.6	0.2	4.8	0.5
Urban	49.2	14.7	10.1	12.8	4.5	1.8	0.1	6.1	0.6
Lowest 40%	21.4	23.5	9.7	24.8	9.7	4.9	0.3	4.7	1.0
Highest 60%	56.0	12.6	10.2	9.9	3.2	1.0	0.1	6.4	0.5

Source: NSO, 2002

The national government has acknowledged the necessity to enter in the struggle against the increasing poverty and lack of access to basic services. In the efforts to reduce the lack of access to basic services there was a need to decentralize power. This has been established by means of the Local Government Act in 1991 (Republic Act (RA) 7160)¹⁰. The RA 7160 has devolved the responsibility of providing basic services, as well as the responsibility for enforcing certain regulatory and licensing functions to the local government units. This act also encourages civil society i.e. NGO's and community organization to actively participate in the delivery of these basic services and sustainable development. Soon after the implementation of RA 7160, the national government introduced the public-private partnership in the provision of basic services. This was first realized in the water supply services in parts of Manila. For more information on the subject of national policies in regard to the provision of water supplies see chapter three.

2.3 BASIC GEOGRAPHIC CHARACTERISTICS NEGROS OCCIDENTAL

This paragraph will present a short introduction to the province of Negros Occidental i.e. the basic geographic and economic features as well as several facts and data as regards poverty in the region. The actual research is performed in Bacolod City, the capital city of this province. Negros Island is part of the many islands that compose the Visayas (see figure 2.1). The Visayas is centrally located in the Philippines with the island of Mindanao in the South and the island of Luzon in the North. With a total land area of 12,710 sq km Negros Island is said to be the fourth largest island in the Philippine archipelago. The Island is demarcated by the Visayan Sea on the north and the Sulu Sea on the south.

Figure 2.1: a) Map of the Visayas; b) Map of Negros Occidental.



Source: official website of the province of Negros Occidental, 2004.

On the north-south axes of Negros Island there is a large mountain range. The highest peak of this mountain range is the volcano Mt. Canlaon (2,465 m). The mountain range divides the island in an eastern and western part. Politically the island of Negros is divided into two provinces. The South-eastern part of Negros Island is the province of Negros Oriental.

¹⁰ Section 17, basic services and facilities (a) Local government units shall continue to be self reliant and shall continue exercising the powers and discharging the duties and functions currently vested upon them. They shall also discharge the functions and responsibilities of national agencies and offices devolved to them pursuant to this code

Negros Oriental is part of the Central Visayas or Region VII. In the North-western part of the Island is the province of Negros Occidental. This province is part of the Western Visayas or Region VI (see appendix 1). The subsequent part of this thesis will focus upon the latter province, in particularly on the capital city of this province i.e. Bacolod City.

Negros Occidental is one of the five provinces that compose the Western Visayas or region VI. The province alone consists of 13 cities and 19 municipalities, and has a total land area of approximately 7,926 square kilometres (Negros Occidental Website, 2004). According to the NSO, the province of Negros Occidental is the fourth most populated province in the country. It has a total population of a little more than 2, 5 million people. In the second half of the 90's the province had an annual growth rate of 1.13 percent (NSO, 2000). The population density is estimated at 324 persons per sq km (NSO, 2000). The main languages spoken in the province are Ilongo and Cebuano.

In the province of Negros Occidental there are two pronounced seasons, the wet and the dry which differ in the northern and southern regions. These seasons influence the availability of water resources and water supplies. The focus of this thesis is on the northern part of the province. For the Northern part of the province the dry season is from late December to early parts of May. The rainy season starts in June and reaches its peak in September. The Northern monsoon prevails during the dry season. The average temperature in the province is set at 26°C. The warmest months in this region are April and May. There are six major rivers in the province, which predominantly emanate from the eastern slope of the volcanic mountain range. Along these big rivers, flood prone areas can be found. Especially during rainy season these rivers often run outside their beddings and can cause extensive damage to agricultural and urban areas.

2.3.1 ECONOMY

Negros Occidental's main economic activity is the cultivation, transportation and production of sugar. The province is considered to be the nation's "sugar bowl". In the province more than half of the country's sugar is produced. There are several sugar refineries scattered over the province. The sugar refinery found in the municipality of Victoria is even considered to be the biggest sugar refinery in the world.

The extensive cultivation of sugarcane started in the latter half of the 19th century. In the first half of the nineteenth century the Province was still sparsely populated. After the economic success of the sugar industry, the population started growing rapidly. The increasing demand for sugar in Europe and America was the thriving force behind the economic developments. The whole province had experienced enormous benefits from the developing sugar industry. However, mid 70's the prices for sugar dropped. The sugar price hit an ultimate low point in 1985. A substantial economic crisis followed.

To fight the economic depression, various agricultural diversification programs were developed. This has had some effects as during the nineties there were several economic improvements, partly because of these agricultural diversification efforts. The large scale cultivation of sugarcane nevertheless is still prevalent in the province. Aside from the sugar industry, the province's fishing industry is an important contributor to the local economy. There are several fish and prawn ponds spread across various localities. Another important economic aspect of the area is its rich mineral deposits, offering mining industry potentials. Minerals that abound in the province are copper, comprising the biggest bulk, as well as gold, silver and molybdenum (EDP, 2004).

2.3.2 POVERTY

The presence of large scale poverty is one of the major problems in the province. The annual per capita poverty threshold for the Visayan region in the year 2000 was set at 11,313 php¹¹ a month (NSO, 2000). This is set in line with measurements of the threshold vis-à-vis the poverty incidence in the country. As mentioned above, this threshold refers to the proportion of families with a per capita income below the poverty line. The poverty thresholds are computed for every region on an urban/rural basis. The poverty threshold for the province is the weighted average of the urban/rural thresholds.

The poverty incidence of families in Negros Occidental has demonstrated an increase from 1997 to 2000. The poverty threshold specified for Negros Occidental was set at 11,113 php a month (NSO, 2000). In 1997 the poverty incidence of families in the province was set at 37 percent. This percentage has since increased to 42 percent in 2000 (NSO, 2000). These figures are much higher than the national percentage of poverty incidence in the Philippines. To be exact, the national poverty incidence of families in the Philippines for both these respective years was set at approximately 28 percent.

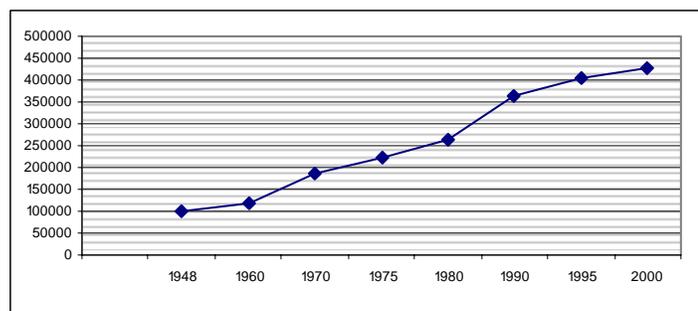
There is a clear income gap between families in urban and rural areas, with a greater poverty incidence in rural areas than in the urban areas. However, urban poverty measured by the NSO in Region VI is still high when it is set against the national figures of urban poverty in the Philippines. In the year 2000 poverty incidence in the urban areas of the Philippines was set at approximately 20 percent, while poverty incidence in the urban areas of Region VI was set at 27 percent (NSCB, 2000).

2.4 BASIC GEOGRAPHIC CHARACTERISTICS BACOLOD CITY

As early as the year 1849 Bacolod City was officially established as the capital of the Negros province. The city of Bacolod is situated on the north-western coast of the province of Negros Occidental, on a level area that slightly slopes towards the sea. Bacolod is bordered by the Guimaras Strait in the west, and drained by several rivers flowing west-northwest into the Guimaras Strait. In the north the city is enclosed by the city of Talisay, in the south by the city of Bago and in the east the municipality of Murcia (see figure 2.2). Near the city there are two large volcanoes i.e. Mt. Mandalagan in the east and Mt. Canlaon in the southeast. This is the main reason for the fact that Bacolod City is underlain by volcanic rocks, consisting of volcanic lava flows and pyroclastic flow deposits with alluvial materials deposited along the river courses (Gemora, 2004).

Since the first settlers came to the region to create a small village near the mouth of the Magsungay river in 1565, the city has grown to become a fast developing metropolis (see figure 2.3). At present Bacolod City has a total population of 429,076 with an average annual growth rate of nearly 1.4 percent (SEP, 2000). The average household size is set at 4.91 (SEP, 2000).

Figure 2.3: Population Growth Bacolod City



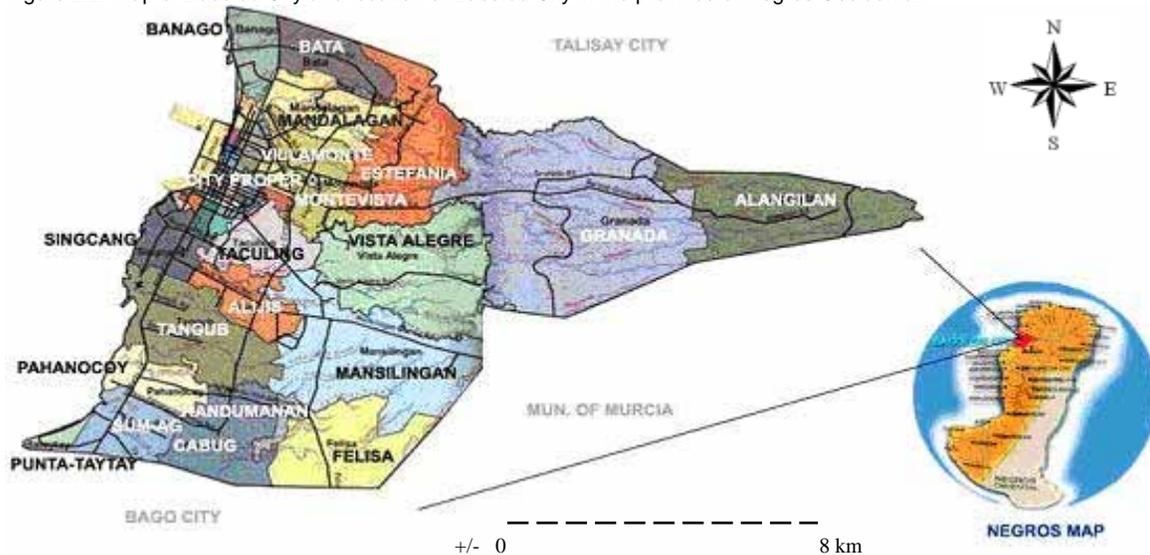
Source: SEP 2000, Bacolod City.

¹¹ php: Philippine Peso = 1 US\$ = ± 55 pesos

The city has a total land area of 156.10 sq km. With around 2,756 persons a sq km, Bacolod City is by far the most densely populated area in the province. Since 1984 the city has officially been classified as highly urbanized. According to the existing land use data, 29 percent of the city's total land area is residential, 2 percent is commercial, and 2.7 percent institutional and only 1 percent is assigned to be industrial. The majority of the people in Bacolod City are Roman Catholic (86 percent), followed by Baptists, Evangelicals and other protestant groups. The major dialect spoken in the city is Hiligaynon (Ilongo) and Cebuano.

The largest part of the city i.e. 56.4 percent is used for agricultural purposes. In most of the agricultural areas sugarcane is cultivated. The remaining 7.7 percent are roads, rivers, fishponds and water bodies (SEP, 2000). Bacolod is politically divided into 61 barangays, of which 41 barangays are appointed as urban, and 20 barangays as sub-urban or rural. The barangays are composed of a total of 620 puroks. In the year 2000 only 88,983 people or 20 percent of the total population were recorded living in the urban barangays of the city. Roughly 80 percent of the total population lives in the sub-urban or rural areas.

Figure 2.2: Map of Bacolod City and location of Bacolod City in the province of Negros Occidental.



Source: official website Bacolod City.

The number of people living in the sub-urban or rural barangays of the city is growing, while the number of people living in the urban barangays is rapidly declining. The population of the urban barangays has decreased approximately 9.3 percent over the period of 1995-2000. The number of people living in the sub-urban or rural barangays in that same period had increased by around 11.8 percent (SEP, 2000). This is partly caused by the increasing number of residential subdivisions in the sub-urban or rural areas, the migration to the city as well as the relocation of various squatter settlements in the centre of the city to the sub-urban or rural barangays.

2.4.1 WATER AND SANITATION

As mentioned above, there are three big rivers passing the city of Bacolod i.e. the Lupit, Magsungay, and Ngalan. These rivers emanate from a chain of mountain ranges in the eastern parts outside the city boundary. The eastern slope of the mountain range is also the area where the official watershed of Bacolod City is located. The geologic structures are made out of coarse and porous units of the pyroclastic flow deposits (tuffaceous sandstone).

These are considered to be the water bearing formations in Bacolod City (Gemora, 2004). The watershed area of Bacolod City, better known as the Caliban Imbang watershed, is the main recharge area for Bacolod's water resources.

In line with RA 7160 the Local Government Unit (LGU) is responsible for supplying the basic services (see paragraph 2.2.6). The water supply services in Bacolod City are the responsibility of the local water district. The Bacolod City Water District (BCWD), better known as the BACIWA, is the only governmental water supply system in Bacolod City. The NSO survey of 2000 states that the households main source of water are the community water systems, followed by the use of deep wells and water from dug wells, springs, lakes, rivers and rain. More on the Caliban Imbang watershed as well as the local water utility can be found in chapter 3.

Figure 2.4: a) Office of the Local Water District BACIWA; b) A small polluted river running through the city.



The most common sewerage systems used by industrial, commercial and residential areas are septic tanks, open canals, dead creeks and rivers that drain to the Guimaras Strait (SEP, 2000). There is no official drainage system present in Bacolod City. There are sixteen flood prone areas in the City, which are mainly communities in the low lying areas near the sea and riverbanks. The next part of this chapter will deal with the various survey areas that have been used for the case studies.

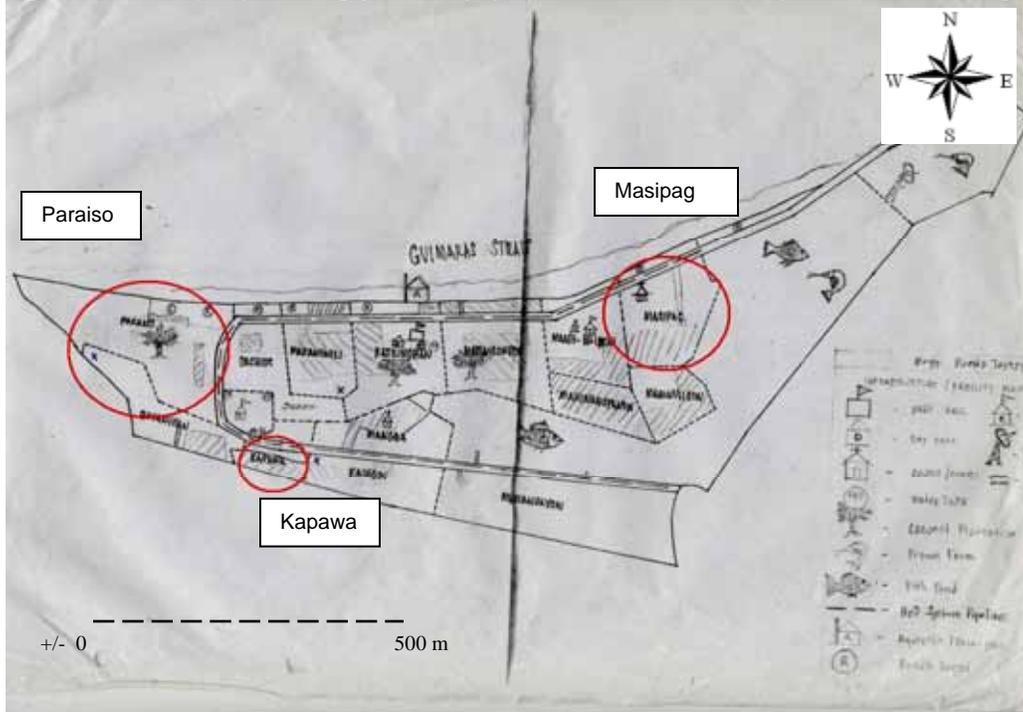
2.5 THE CASE STUDY AREAS

This paragraph will introduce the research areas i.e. purok Kapawa, Masipag, Paraiso, Magnolia and Sawmill. These areas are located within respectively barangay Punta Taytay, barangay 7 and barangay Bata. These research areas were chosen as they represent different geographical situation as well as differences in their current situation as regards to piped water supplies. This paragraph can be used to obtain an impression of the current condition in which the households in these research areas are situated.

In the first part of this paragraph the barangay first visited for this research will be introduced. Barangay Punta Taytay was mainly chosen as a research area because of the fact that this barangay did not have access to piped water supplies from the local water district BACIWA. Three of the five puroks which have been selected as case study areas are located in barangay Punta Taytay (see figure 2.5). These puroks were selected on the basis of their geographical location within the barangay as well as their current situation in regard to water supplies. The following descriptions can be used to obtain an impression of the general condition in which the households in the research areas are situated.

Barangay Punta Taytay is a rural/coastal barangay within Bacolod City (see figure 1.4). On August 24, 1958 the barangay became independent from its neighbouring barangay Sum-Ag. The name “Punta Taytay” was thought to be extracted from the barangay’s unique land marks – the two bridges on opposite side. Punta Taytay literally means “end of bridge”.

Figure 2.5: Drawn up map of barangay Punta Taytay with the location of the three puroks within the barangay.



Source: Barangay Development Plan (BDP) barangay Punta Taytay, 2004.

The barangay is situated in the south-eastern tip of Bacolod City near the border with Bago City. Within the borders of the barangay there are still some remains of the old fishing villages of the city. Around 50% of the land area is considered residential. Although the barangay is almost hundred percent flat, large parts of the land area are still uncultivated. The main reason why a large part of the barangay is still uncultivated are the large marshy areas in the barangay. A second reason would be that 25% of the barangay’s land area is occupied with fishponds. Many of these fishponds are currently not in use. Another main characteristic of this barangay are the beaches. Nearly 25% of the total land area includes beaches. Large areas of land in barangay Punta Taytay are owned by a few influential and prominent families. Most houses build on the areas owned by these families are squatters.

Presently, the barangay has a population of 5,796 which make a total of 1,224 households scattered over 15 puroks (BDP, 2004). The average household size is 4.7 persons. The majority of the people in this barangay are dependent on income through fisheries or fisheries related work. Many fishermen have a hard time collecting an adequate income. Therefore, many people tend to be more attracted to alternative livelihoods i.e. driver, mechanic or labourer. A major economic development in the barangay is the tourism sector. Several beaches are already occupied by commercial establishments; others are not yet fully used for the tourism purposes. The local and city government is involved in stimulating the tourism sector developments in Punta Taytay (BDP, 2004).

The presence of squatters is one of the main issues in the barangay. Other issues are the lack of facilities and infrastructure. One of the facilities which is lacking is a potable piped water supply system. Punta Taytay is not connected to the service system of the Bacolod City Water District (BACIWA), the local water utility (see also chapter 3.4). The barangay's main problem related to water and water resources is the salt water intrusion. This occurs usually during dry seasons, when groundwater levels are low, and groundwater extraction is high. Other main problems in this area are linked to the lack of road infrastructure.

Table 2.2: Population characteristics in case study areas Punta Taytay.

	Population	Percentage of total population	Number of households	Percentage of total households
Punta Taytay	5,796	100.00	1,224	100.0
Kapawa	312	5.38	66	5.4
Masipag	335	5.78	76	6.2
Paraiso	332	5.73	80	6.5

Source: Barangay Development Plan, Punta Taytay 2004.

Public transportation to get in and out of the barangay is mainly possible by jeepney¹². Jeepneys are the main form of public transportation in the City of Bacolod. There is an irregular schedule for several jeepneys in between the barangay and the city centre. Barangay Punta Taytay is on the end of one of these routes. It takes approximately 20 minutes to get from the city centre to the barangay. The main transportation within the barangay self is the tricycle¹³ or the trisikad¹⁴.

The three puroks selected for case study areas are located in different parts of the barangay. Most areas in these puroks are accessible from the main road, which is the only concrete road running through the barangay. The households which are not accessible by this main road can be reached by small unimproved or semi-improved paths. The following part of this paragraph will give more detailed descriptions of these three puroks.

Figure 2.6: a) Beach views Punta Taytay; b) Entrance Barangay Punta Taytay.



2.5.1 KAPAWA

The first area visited in barangay Punta Taytay was purok Kapawa. This purok is located at the south-eastern border, close to the Municipality of Bago. Near the border with Bago, within the boundary of this purok, there are several old fishponds that are not in use anymore.

¹² Jeepney: an extended jeep which is customized to be used for public transportation.

¹³ Tricycle: a motorbike with span, used for transportation of mainly people, as well as products

¹⁴ Trisikad: bicycle with span, used for transportation of people or products i.e. containers of water, garbage etc.

A more natural border on this part of the purok is the small river. This river is visually polluted and at the time of visit (June, 2004) smelled more like an open sewerage. On the other side of the purok virtually all houses are located near to the main road. In the east of purok Kapawa bordered by purok Kaingin and in the west by purok Bayanihan. Throughout the purok there are several unimproved paths leading to the houses.

In purok Kapawa many people live in structures made of semi-permanent materials i.e. bamboo, wood and nipa¹⁵ (see figure 2.7). Most of the houses made of these semi-permanent materials are located near the border with Bago, the river and the fishponds. These areas are also flood prone areas, thickly populated, and visibly polluted by garbage and excrete. A number of households in this purok keep pigs and fighting cocks in cages near or under their homes for alternative livelihoods. Some households locate sari-sari stores¹⁶ in or near their homes as well. Other structures, generally owned by the more well-off households, are made of more durable materials like concrete. These houses are often located near the main road in the less thickly populated areas and on higher grounds.

There are no official sanitation facilities and many households make use of their own build *posso negro*¹⁷. Electricity is widespread (although not always legal) and there is no connection to the official water supply system of the local water utility (BACIWA). Though there are several houses which have access to the barangay water system, this system does not provide potable water (see also chapter 4.3.5). The water from the barangay system can only be used for other purposes than direct consumption i.e. bathing, watering plants, cleaning etc.

Figure 2.7: a) Views in purok Kapawa; b) Fishponds for prawn fishing near purok Masipag.



2.5.2 MASIPAG

The second purok which is used as a case study area is purok Masipag. Purok Masipag is located in the western part of the barangay. In the north, the purok is bordered by the beach and the Guimaras Street. In the east of the purok there are several fishponds. In the south lays purok Mabinuligon and in the west is purok Maabi-abihon.

¹⁵ Nipa or *nipah* is a palm that mainly grows in the coastal areas of Southeast Asia. The leaves are used for covering the roof.

¹⁶ Sari-sari store: "Sari sari" is Tagalog for "various kinds" and describes what you can find in the many sundry stores that can be found on any street in the Philippines the ubiquitous sari-sari stores are also belonging to the typical inventory of the Philippines like the Jeepney, Barong or the Sampaguita garlands. They can provide the owners with an additional income.

¹⁷ *posso negro*: a self made alternative septic tank, primarily constructed as a hole in the ground with concrete walls and covered by a concrete plate/ pit latrines with poor ventilation.

A few houses in the purok are located near and on the beach. Most of the houses are sited more inland. The main concrete road that runs through the barangay divides the purok in two. As in purok Kapawa, are the houses located near the main road made out of more permanent materials i.e. concrete and bricks, while the houses near the sea or more inland are made of semi-permanent materials i.e. nipa, wood and bamboo. Many squatters live in the houses made of the semi-permanent materials. These houses can be reached by unimproved or semi-improved paths.

Several areas in the purok are very thickly populated, however most areas can not be used for building houses. These areas, which are clearly not suitable for housing, are mainly flood prone areas. Even though these areas are clearly not suitable for housing, there are several residents that have built their houses there. In due course these households often have problems with floods during rainy season (see box 2.1).

Box 2.1: Flood Prone Areas in purok Masipag.

Christina is a 30 year old housewife. She lives with her family of 6 in a small house made of bamboo, wood, nipa and a corrugated iron roof. Her husband is a carpenter. She has a son of 19 years old who is still in college, another son of 7 and two young daughters of 6 and 4 years old. The families' income is merely 3,500 php a month. Their house is located in the flood prone area of purok Masipag. Her family suffers from the extreme flooding during the rainy season (April-May). While she is cleaning the house with the water from a nearby dug well she talks about her troubles with water. They have agony because of water. The flooding every year is terrible. If she could, she would move to another place. Move to a place that does not flood two months every year. In these two months the water sometimes can reach their knees. They can not afford to move. She has to accept the fact that those two months every year the water will come into their home. She continues cleaning the house, while one of her daughters is off to the dug well to collect more water.

In Masipag there is a lack of adequate public facilities. Though most houses have a connection to the electricity network (legal and illegal), there is no drainage or sewerage system present in the purok. There is no connection to the local utility water system or a connection to the barangay water system as well (see also chapter 4.3.5). Some of the residents work as water peddlers to supply containers with drinking water to households in the barangay. There are no sanitation facilities available in the purok. Many houses make use of a *posso negro* as their main sanitation facility. The other alternative is that they just urinate and defecate in the nearby sea.

2.5.3 PARAISO

The last area visited in barangay Punta Taytay is purok Paraiso. Paraiso is located in the most southern tip of the barangay near the main road and on the beach. The purok is bordered by the Guimaras Strait in the north, the eastern border is the road, the southern border is purok Bayanihan and in the west there is a large area owned by an influential wealthy family that forms the border with Bago. This area is restricted for visitors and used as a private beach. The area is surrounded by a large concrete wall and protected by guards standing in front of the entrance next to the main road. Many squatters have built their houses alongside or in close proximity to this concrete wall.

On the beach there are large areas occupied by beach cottages which are used for commercial purposes. Many houses are built behind the beach cottages. These households are often directly or indirectly involved in the tourist industry by facilitating karaoke, selling food or beverages etc. Other residents still depend on fisheries for their income (see figure 2.8).

In purok paraiso many households live in structures made of semi-permanent materials i.e. bamboo, wood and nipa. As in the previous puroks, the more wealthy households live near the main road in structures made of more durable materials i.e. concrete. Most semi-permanent houses are built near or on the beach of Paraiso. To reach these houses you have to take a walk along the beach. The entrance of the beach and purok is the entrance for the commercial beach cottages as well. If people want to visit the beach or the beach cottages, they need to pay a fee at the entrance. The beach is mainly used for commercial purposes; however the fisherman living in the houses on the beach can also still use the area for other purposes (see figure 2.8). An example of this can be found at the entrance of the beach where woman sell the fish and other sea food to visitors.

Figure 2.8: a) Fisherman cleaning and repairing their nets on the paraiso beach; b) A beach cottage for commercial use.



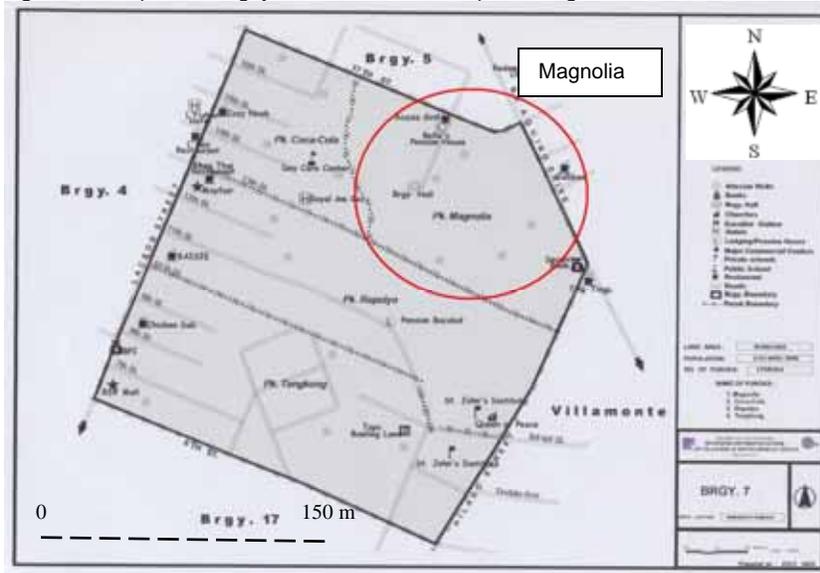
There are no public facilities present in the purok. Although electricity is available, in many cases this is clearly not legal. There is no drainage system, nor is there a water system from the barangay or the local water utility. For sanitation facilities many people use a posso negro or urinate and defecate in the nearby sea. The purok also lacks the availability of improved infrastructure. Most houses are only accessible by small paths in between the houses and by walking over the beach. The houses near the road however often do have private paved pathways which give them access to the main road.

2.5.4 BARANGAY 7 – PUROK MAGNOLIA

One of the more urban puroks selected for a case study area is located within barangay 7. This barangay is an urban barangay and part of the centre of Bacolod City. The barangay is located on the border of the city centre, near the Public Lagoon and the Provincial House. There are an estimated total number of 3,422 people living in this barangay. These people form a total number of 674 household, scattered over 4 puroks i.e. Magnolia, Coca Cola, Repolyo and Tangkong. The average household size in the barangay is set at 7 persons (BDP, 2004). There are various commercial establishments located in barangay 7.

The residential areas in the barangay are densely populated. A variety of educational centres i.e. St. La Salle University and Colegio de San Agustin-Bacolod, are located in the vicinity of the barangay. This fact is cleverly used by several families, which have improvised their homes to function as boarding houses for students. The problems in this barangay are mainly related to solid waste management and a proper drainage system. The local water utility (BACIWA) is providing water services in the barangay, although there are several households who are not connected to the system. Only one purok is selected for a case study. This is purok Magnolia.

Figure 2.9: Map of Barangay 7 with the location of purok Magnolia.



Source: Barangay Development Plan (BDP) barangay 7, 2004.

Purok Magnolia is located in the north-eastern part of Barangay 7 (see figure 2.9). The purok is bordered by the B.S. Aquino Drive, purok Coca Cola and Repolyo. The majority of the land use is housing. Magnolia, together with its neighbouring purok Coca Cola, is one of the most thickly populated areas of Barangay 7. It is estimated that from a total of 674 households in the barangay there are already more than 200 households located within purok magnolia. Officially, the purok is a squatter area which is increasingly legalized by city ordinance. Most households in purok Magnolia are made of semi-permanent materials i.e. bamboo, wood and corrugated iron roofs. Other houses also contain wooden plates and concrete walls.

Figure 2.10: a) Eskinita in purok Magnolia and houses made of more durable materials; b) Squatter houses near the swamp. These houses are made of semi-permanent materials.



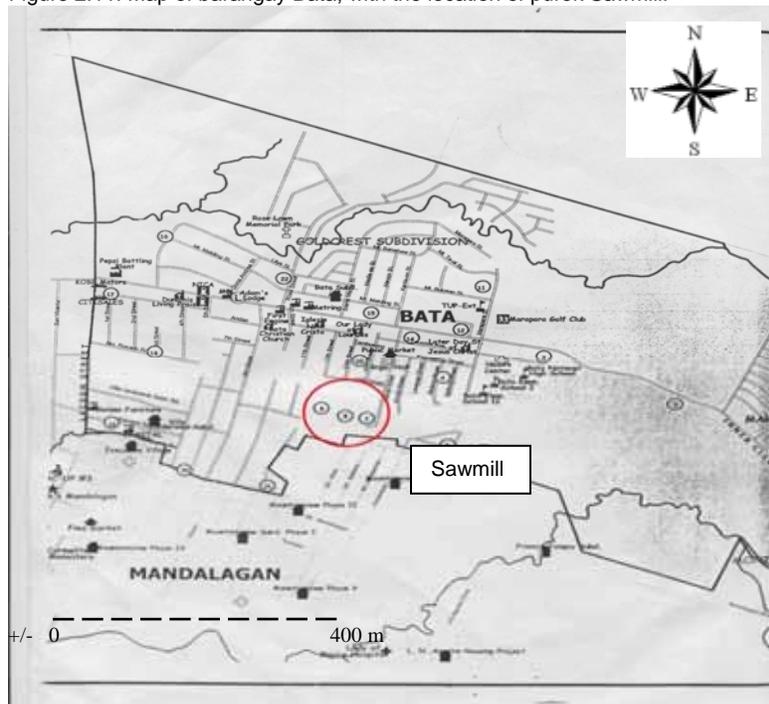
In the purok there are many houses built very near to each other (often back to back). Other houses are built against concrete structures e.g. walls surrounding the commercial establishments or the commercial buildings themselves. There are two large areas not used for residential purposes i.e. the basketball court (covered by a roof) and an open swamp area with parts grassland. This grassland is partly utilized for keeping fighting cocks. The main entrance of purok Magnolia leads to the covered basketball court. From there on, there are no large improved roads that could make the houses in the purok accessible. Though, the many paths and alleys, called *eskenita*'s¹⁸, leading to the houses are partly improved with concrete blocks (see figure 2.10).

As in many other puroks in this barangay there are several households in purok Magnolia that have access to piped water supplies from the local water utility system. The households also have access to the open drainage system. However, although there is an open drainage system present, there are several problems with this drainage system. During rainy season, at times of high peak rain, the water can cause severe floods in various areas (see appendix 5). The drainage system is clearly not durable and is lacking the capacity to drain large amounts of water out of the barangay. In regard to the sanitation facilities many households still utilize a private restroom with a *posso negro*.

2.5.5 BARANGAY BATA – PUROK SAWMILL

The last area selected for a case study is located within barangay Bata. Originally barangay Bata was a "sitio" of barangay Mandalagan. The area was largely owned by Mr. Charles Newton Hodges, and Irish national who was a then resident of Iloilo. On August 25, 1955 Bata was declared a barrio, which eventually became a barangay. The barangay is bounded by the city of Talisay in the north-east, the Lacson highway in the west and barangay Mandalagan in the south.

Figure 2.11: Map of barangay Bata, with the location of purok Sawmill.



Source: Barangay Development Plan (BDP) barangay Bata, 2004.

¹⁸ **eskenita*: foot walk, the small alley which are located within the squatter areas

There are several large subdivisions located in the barangay. Though the barangay is typified as rural by the planning department it has several urban characteristics. More than 50 percent of the barangays 365 hectares land area is used for residential purposes. This is followed by commercial use (17 percent) and governmental use (14 percent). Only 3 percent is actually used for agricultural purposes (BDP, 2004). There are many commercial establishments located in the barangay, as well a large recreational areas i.e. the Marapara Golf and Country Club, better known as the Negros Occidental Golf and Country Club.

The barangay has a total population of 23,618 and a total number of 6,130 households scattered over 22 puroks and a number of subdivisions. There are 6 creeks and rivers passing through the barangay. One of these creeks runs through the research area (see figure 2.12). Due to obstructions in the rivers' outfall there is a large chance of flooding during rainy season. The rivers have also become a dumping place for excrete and solid waste. Some rivers are visibly polluted and could form a danger to the public health. Though the local water utility system (the BACIWA) is present in the barangay, there are still many areas which are not connected to this water system.

In barangay Bata there are two puroks selected for a case study. These are Sawmill 2 and Sawmill 3. The puroks are located on the Southern border with barangay Mandalagan (see figure 2.11). In the West lays purok Sunriser, in the North purok Magbinuligay and in the East Sawmill 1. Both purok Sawmill 2 and 3 are not connected to the local water utility system. These two puroks have similar characteristics and are located next to each other. In this research Sawmill 2 and 3 will be referred to as purok Sawmill.

Figure 2.12: a) The visibly polluted stream running on the border of purok Sawmill; b) A hand pump between the houses in an alley in purok Sawmill.



The two puroks combined have a total population of nearly 2200 people, which form a total of 346 households. Purok Sawmill is considered to be the most thickly populated squatter area of barangay Bata. In the barangay development plan (2000), the purok is said to be a flood prone area as well. This is mainly caused by the poor drainage system in the barangay. There are however several eskinita's in the purok that partly contain a drainage system. There is also a small creek running on the border of purok Sawmill and purok Magbinuligay which is clearly as drainage. This creek is visibly polluted and filled with solid waste. Most household have access to electricity, although not always legal. There are no sanitation facilities available, however many household make use of a posso negro's.

As in purok Magnolia in barangay 7 most houses in Sawmill are built from semi-permanent materials. However, a small number of the houses are made of more durable materials. Many of the houses made out of the more durable materials are accessible by the concrete road running up to the basketball court. The basketball court forms the main entry of the barangay. From here on, most houses are only accessible by small, primarily unimproved alleys or eskinita's. Some households keep and breed animals i.e. fighting cocks and pigs for alternative livelihoods near their houses. Other households keep small sari-sari stores near their homes. One house near the basketball court also has a computer game arcade next to the house. The area is mainly accessible by tricycle or trisikad.

2.6 SUMMARY

The following table gives a short summary of the characteristics of the above illustrated areas which are used for the survey. The sample sizes for the different case studies show a large variance. In the first place this is caused by the lack of knowledge on the number of households before implementing the survey (in case of Magnolia and Sawmill). Secondly, there have been some constraints in access to the areas, as well as a shortage of time in actually implementing the same sample sizes for the case study areas performed in the later part of the research.

All areas are typified as squatter areas; however purok Magnolia in barangay 7 is increasingly being legalized. In addition it should be noted that the residents of the puroks are not a homogenous group. The most significant differences between the areas are their connection to, or possibilities of connecting to the official water supply system of the BACIWA. Other main difference is the rural or the urban characteristic of the area as well as their geographic location. Although barangay Bata is officially categorized as rural, the purok visited was perceived by the researcher as having urban characteristics. The main geographical difference between the survey areas in Punta Taytay and the other two is that Punta Taytay is a coastal barangay, and the other two barangays are located more inland.

Table 2.3: Summary of characteristics research areas.

Name of area	Type of area	Number of households*	Sample size (n)	Short description characteristics
Kapawa (Punta Taytay)	Urban/Rural squatter, no BACIWA	84	20 (24%)	Near the main road, fishponds and near a polluted river, flood prone area, many trees
Masipag (Punta Taytay)	Urban/Rural Squatter, no BACIWA	79	20 (25%)	Part alongside seashore, part near fishponds, crossing main road, flood prone area, lot's of fisher folk, many trees
Paraiso (Punta Taytay)	Urban/Rural Squatter, no BACIWA	89	20 (22%)	Alongside seashore and main road, commercial beaches, cottages, fisher folk
Magnolia (Barangay 7)	Urban Squatter, with BACIWA	200*	30 (15%)	Thickly populated, small, crowded, several commercial establishments and boarding houses
Sawmill (Bata)	Urban squatter, no BACIWA	346*	30 (9%)	Thickly populated, small, crowded, poor drainage, visibly polluted, small creek passing through
Total			120	

*estimated by the Barangay Officials

3 WATER AVAILABILITY

This chapter will review the management of the water supplies on a national, regional and city level. The focus is primarily upon the management of the water resources and the availability of water as a resource, as well as the organization of public and private water supplies on the city level.

“Let not a single drop of water that falls on the land go into the sea without serving the people.”

-Parakrama Bahul, King of Sri Lanka (AD 1153-86)

3.1 INTRODUCTION

After reviewing the general characteristics of the setting of this study in the previous chapter, the following chapters will specify the setting as regards the subject of this thesis i.e. the household water supply. This chapter will mainly focus upon the subject of water resources, water supply, and the distribution of water in the city of Bacolod. The subject of water as a resource as well as the distribution of water is related to the first key elements in the conceptual framework of household water security i.e. water availability. The next chapter will focus more upon the other two key elements of household access to, and the eventual use of the available water supplies on a household level.

The first element in exploring the management of water as a resource is the question of governance. In the second paragraph of this chapter the national policies and institutions involved in the management of water resources and water supplies in the Philippines are therefore introduced. The third paragraph will review the management of the water resources and the watershed of Bacolod City. In addition to the focus upon the availability of water resources, attention will be given to the distribution of available water supplies in the city of Bacolod.

The national government has officially structured the household water supply systems of the Philippines into three different levels. Level 1 is considered to be a point source system e.g. a well, a spring or rain collector. The level 2 systems are communal faucets, including piped distribution systems. The level 3 water systems are individual household connections, intended for urban areas. This also includes piped distribution networks. These three levels will be used and discussed later in the third and fourth paragraph in which respectively the Local Water District of Bacolod City and the alternative water supplies in Bacolod City are introduced. First several of the main governmental organization concerned with the management of water resource and water supplies in the Philippines will be specified.

3.2 NATIONAL WATER POLICIES AND INSTITUTIONS

Goal number 7 of the UN millennium development goals is to half the number of people that do not have access to sufficient safe water supplies by the year 2015 (UN, 2002). The provision of adequate safe water to every Filipino household is also a very high priority in Philippine national policy. However, despite the many initiatives implemented in the water sector, presently 92 percent of the urban, and only 80 percent of the rural population actually have access to an adequate safe water supply (NSO, 2000). As a consequence a large percentage of households in the Philippines still do not have access to an adequate water supply (Fjeldsenden et al. 2001).

The focus of this paragraph will be upon the governance in the water sector and the management of water as a resource in the Philippines. “One of the main problems regarding the governance of the water sector is the failure to implement the laws, lack of an integrative system as well as the presence of corruption” (Contreras, 2002: 2). Secondly, with the enactment of the local government code in 1991 (RA 7160), the basic services and facilities have devolved to the Local Government Units (LGU). The problem is that “many of the LGU’s do not have the capacity or know-how to manage water resources” (Robinson, 2003: 3). A third problem is “the absence of mechanisms to operationalize an ecosystems approach and a market-based valuation technique in water resource governance” (Contreras, 2002: 2).

Despite the fact that there are still large quantities of water resources availability in the Philippines, unsustainable water withdrawals gradually make water to become a scarce resource. Attending to the matter of water resources in a more integrated and sustainable manner therefore has become a crucial element in securing sufficient safe water supplies for future needs. The focus of this paragraph is on securing the availability of water supplies in the city of Bacolod and the Caliban Imbang watershed. The next part will first start with an introduction on the organizations and agencies involved with securing water supplies in urban areas on a national level, as well as the management of the water resources.

3.2.1 URBAN WATER SUPPLY IN THE PHILIPPINES

For a long time, the water utility systems of the Philippines were government owned. The Local Government Units (LGU’s) operated the systems, with technical assistance from the Bureau of Public Works (BPW). In 1955 there was a change in policy, and the National Waterworks and Sewerage Authority (NAWASA) centralized and consolidated the control of urban water supplies to the national government (Robinson, 2003). Approximately 15 years after the centralization by the NAWASA, decentralization was issued. The Provincial Water Utilities Act (the Presidential Decree 198) was implemented in 1973 and the LGU’s were authorized to form water districts (see paragraph 3.2.3).

Since this decentralization there are three principal agencies that have become responsible for the various water supply systems in the urban areas of the Philippines. The first agency that is responsible for water supply systems is the LGU’s. The management of the provincial water systems in more than 1000 ‘small’ towns was passed back to these LGU’s. Secondly, in approximately 500 ‘large’ cities in the provinces water supply services are now provided by autonomous local water districts. The third agency, which is primarily responsible for the services in Manila, is the Metropolitan Waterworks and Sewerage System (MWSS).

A year after the decentralization of the water supply systems in 1971, several additional institutions and agencies were founded. The creation of the water districts for example led to the development of the Local Water Utility Administration (LWUA). The national government also formed a coordinating and regulating agency for the management and development activities of all water resources in the Philippines. This regulating agency was the National Water Resources Council (NWRC). Since 1987 the NWRC was renamed to become the National Water Resources Board (NWRB). In the next part of this paragraph these two agencies involved in the Philippine water sector, as well as the water districts, will be discussed in more detail.

3.2.2 THE NATIONAL WATER RESOURCES BOARD (NWRB)

The NWRB formulates and develops policies on water utilization and appropriations. This means that the NWRB is primarily in control and in charge of the supervision of water utilities, franchises, the regulation and rationalization of water rates. The main objective of the NWRB is to attain a scientific and orderly development of all water resources in the Philippines. This eventually should lead to an optimum utilization, conservation and protection of water resources, to meet the present and future needs.

There are numerous laws that define the role of the NWRB. The most important laws are: the Presidential Degree (PD) 1067, also known as the Water Code of the Philippines (1976); the Constitution of the Philippines (1987); Executive Order No. 124-A (1987) and the PD 1206 (1977) which eventually assigned the main functions of the board of water works and the defunct public service (BPW) to the NWRB. The NWRB board is composed of representatives from a variety of agencies: the Department and Natural Resources (DENR); the National Economic and Development Authority (NEDA); the Department of Justice (DOJ); Department of Finance (DOF); the Department of Health (DOH) and a representative of the National Hydraulic Research Centre, University of the Philippines (UP-NHRC). In addition to the board, the NWRB also has a full time staff with engineers, scientists, economists and legal specialists, as well as financial and technical personnel.

With the exception of the MWSS and the areas of the LWUA Water Districts, the NWRB has direct control over the operation of public water supply services. In cases when the NWRB is not capable of dealing with a particular situation, the Philippine Water Code provides them with the ability to deputize any official or agency to perform the specific function or activity. The deputized agencies are then authorized to accept, investigate, and process permit applications for the NWRB (Navarro, 2003). For example, the NWRB can deputize a water districts to monitor well drilling activities within their franchise area. This is also the case in the Bacolod City Water District area. The next part will discuss the role of the water districts as well as the LWUA in more detail.

3.2.3 LOCAL WATER UTILITY ADMINISTRATION (LWUA) AND THE WATER DISTRICTS

The Local Water Utilities Administration (LWUA) is a governmental organization formed in 1973 under Presidential Decree No. 198. The PD 198 is also known as the “Provincial Water Utilities Act”. The LWUA is responsible for the promotion and development of the water district system in the Philippines on a national level. This is mainly realized by means of special lending programs for local water districts and Rural Water Association (RWSA). The LWUA has the general task to provide financial, technical, institutional development and regulatory services to all local water utilities (LWUA, 2004).

As mentioned above, the water districts were created along the lines of the Provincial Water Utilities Act of 1973. The LWUA secures funds for various short and long term improvement programs of these water districts. These funds come from both local and international lending institutions i.e. the World Bank (WB), Japanese International Cooperation Agency (JICA), Asian Development Bank (ADB), Australia’s AUSAID etc. The water districts were allowed to take on large loans, even if they were not commercially viable. After a resolution in 1998, the National Economic and Development Authority (NEDA) however urged the LWUA to support only systems that were deemed financially viable (Robinson, 2003). This meant that only the water districts capable to fully recover the costs and pay back their loans, are presently able to obtain financial support from the LWUA. In case of a defaulting water districts, the LWUA is empowered to fully or partially take over the management and/or policy making of the water district in question.

An important aspect of the water districts is their independence from the jurisdiction of any political subdivision. Though formed by the LGU's, they are not directly under their jurisdiction. The water districts previously had the same power, rights and privileges given to private corporations. But since a Supreme Court decision in 1991, which stated that the water districts should be government owned and controlled corporations, this has been changed. This court decision made the water districts subject to government regulations on civil services, budget, management and audit. The water districts are currently designed as quasi public, non profit corporations that operate autonomously and without interference from the LGU (Robinson, 2003: 3). There is however indirect involvement of the LGU. This indirect involvement of the LGU's comes from the locally elected officials.¹⁹

At present there are a total of 588 water districts scattered across the Philippines. The total area covered by these water districts consist of more then 700 cities and municipalities. Of all these water districts, only 444 districts are operational, serving a total of 12 million people. It is estimated that the water districts serve only 63% of the urban population in the operational district areas (LWUA, 2004). The water districts have been classified into five categories, namely: Very Large, Large, Big, Medium, Average, and Small. This categorization is based on the water district's gross receipts, total fixed assets, net income before depreciation and interest, number of service connections, number of employees, and nature of operation (LWUA, 2004). This categorization plays an important role in the tasks a local water district can perform.

In addition to the water districts in the urban areas, there are also Rural Water Supply Association's (RWSA). Although these organisation are not used in this research (however the BPWSS could be a RWSA – see chapter 4.3.5), it is important to give a short overview of these RWSA's to fully understand the functioning of the LWUA. After the abolishment of the Rural Water Development Corporation (RWDC) in 1987, the LWUA is in charge of the RWSA's. The RWSA are a non-stock, non-profit water users association. They are normally registered with LWUA as franchises to operate a rural water supply system. There are a total of 587 registered RWSA's, of which roughly 300 are operational (Robinson, 2003). These water supply systems usually do not cover the whole town or barangay. Generally RWSA's are small scale town or barangay based water supply systems. The largest RWSA has approximately 2,280 house connections (LWUA, 2004). The systems provide predominantly level III systems. The next part of this paragraph will discuss the water resources and watershed management on a national level.

3.2.4 WATER RESOURCE AND WATERSHED MANAGEMENT

Due to its geographical location, the Philippines still have abundant water resources (Barba, 2004). Water resource management in the Philippines is largely an inter-sectoral affair. The management of the water resources hence needs accurate coordination and requires the setting up of institutional and regulatory mechanisms. As mentioned in the beginnings of this paragraph there still are many problems as regards the coordination between different agencies and the implementation of the various laws by these different agencies. Figure 3.2 gives an overview of the various documents required for the different water usages, and the agencies in charge of issuing these documents. The main problem within the structure is the lack of an integrative mechanism to interrelate the different functions of the various institutions and agencies (Elazegui, 2001).

¹⁹ Mayors retain indirect influence because they appoint the Board of Directors of Water Districts on fixed term appointments.

Figure 3.1: Interagency collaboration in water use regulation.

Required Document	Agency in charge	Purpose of water use
Environmental Compliance Certificate or Certificate of Exemption	Department of Environment and Natural Resources (DENR)	All water permit applications except for domestic purposes
Certificate of Registration with Articles of Incorporation (for corporation or association)	Security Exchange Commission (SEC)	All water permit applications
Initial permit (as per R.A. 7156)	Department of Energy (DOE)	Power purposes
Physical and chemical analysis of water	Department of Health (DOH)	Recreation/commercial purposes
Clearance (if within the watershed of Laguna Lake)	Laguna Lake	Fisheries and industrial purposes
Certificate of registration of business name for sole-proprietorship application	Department of Trade and Industry (DTI)	Industrial purposes
Certificate of conformance (for water districts)	Local Water Utilities Administration (LWUA)	Domestic purposes
Certificate of registration (if a Barangay Waterworks Association)	Barangay unit	Domestic purposes
Clearance (if reuse of wastewater for human consumption)	Department of Health (DOH)	Domestic purposes
Clearance from affected deputized agent	National Irrigation Association (NIA), Metropolitan Waterworks and Sewerage System (MWSS), Department of Public Works and Highways (DPWH), Water District, National Power Corporation (NPC)	

Source: Elazegui (2001)

The NWRB is the main regulating and coordinating agency with the responsibility for water resource management in the Philippines. Based on the various physical-geographical and climatic conditions, the NWRB has divided the Philippines into 12 water resource regions. These regions serve as management units of water resource developments (Dayrit, 2000). Next to policy initiatives concerning Philippine economic-environmental and natural resources, the NWRB coordinates with the water districts on matters that govern drilling, operation and maintenance of wells and water resources. To address the issues on water resource management, the NWRB called for the immediate adoption and subsequent implementation of an Integrated Water Resource Management (IWRM), based upon river basins as the direction for future water resources planning and investment (Barba, 2004)

On a lower scale, the national government is planning to develop a watershed based management program. A watershed based resource management approach facilitates the interrelating of regulatory and institutional mechanisms. In the first place the LGU's are responsible for protecting the watersheds. Since oktober 1996 the Department of Environment and Natural Resources (DENR) is also in charge of protecting the watersheds (DENR, 2005). For any activity in the watershed, permits are needed from other agencies (for example the DPWH, DOE, NWRB etc). Thus it can be concluded that at present there are still too many agencies involved in safeguarding the sustainable use and management of the watersheds. This present situation creates the paradox in which "...one entity for example is responsible for planting trees, while another agency gives the permit to cut down the tree" (Elazegui, 2001: 4).

It is estimated that in the Philippines there are a total of 183 watersheds. Approximately 62 percent of these watersheds are assessed to be in critical condition (Elazegui, 2001). Destructive cultivation practices, increasing deforestation and various other human interferences are the main cause for the deterioration of these watershed areas. The deterioration of the area limits the watersheds' capacity to retain sufficient water supplies for the dry season and eventually could cause shortages of water resources.

Several laws were enacted to address the problems of watershed degradation i.e. the Forestry Reform Code, Philippine Water Code, Provincial Water Utilities Act, NIPAS Act and many others. However, these laws only comprise a partial implicit framework, which fails to address the real problems as regards the watershed management (Barba, 2004).

Box 3.1: Water resources in Metro Cebu.

Metro Cebu, covering 3 cities, 5 municipalities and having approximately 1.3 million residents, is considered to be the second largest urban area in the Philippines. The population has doubled over the last 20 years (David et al, 1998). Cebu depends largely on groundwater resources to provide residents with adequate water supplies. The growing population, as well as extensive and intensive economic development, led to an increasing demand of water supplies. Moreover, the growing contamination of underground aquifers and surface water bodies affected not only the quality but also the quantity of water supplies for domestic and other uses (Largo et al, 1998). Since the groundwater supply of metro Cebu is naturally limited and use of surface water is considered to be too costly, this situation called for a change in policies.

The watersheds surrounding Metro Cebu are in a critical state (David et al, 1998). The pumping of groundwater is virtually unregulated despite of the reported depletion of the groundwater reserves, as well as the saline intrusion of coastal aquifers. There is no sewerage collection or treatment efforts and there are weak regulations of industrial effluents and non-point sources of water pollution which affect the already depleted quality of rivers streams and other water bodies. The Metro Cebu Water District (MCWD) has increasing problems supplying the already small percentage of households that is connected to their water supply system. Households depend more and more on the less potable water from alternative sources or have to buy expensive mineral water for their daily use.

There is a need to protect the depleted water resources of Metro Cebu. Researchers call for a more efficient, equitable and sustainable urban water resource management following policy and institutional reforms (David et al.). The organization of Cebu United for Sustainable Water (CUSW)²⁰, established in 1995, addresses the concerns on water shortages as well as the conservation and protection of Cebu's watersheds and aquifers. CUSW is among the first organized civil society-initiated multi sectoral and water-focused coalitions in the Philippines. The CUSW try to accomplish their goals by rehabilitating the deforested and eroded watersheds as well as the degraded inland and coastal aquifers. Other projects of the CUSW aim to protect and conserve the existing ecological systems, and increase environmental sustainability by improving local living conditions of communities in the watersheds. These projects and programs are a necessity in securing sufficient water resources for future needs. The example of Metro Cebu is a lesson learned for policy makers in other growing urban areas of the Philippine archipelago. It is better to prevent the depletion of groundwater resources, then to try to rehabilitate the already depleted reserves.

At this point it is important to acknowledge that the watershed should be taken as a planning unit in the management of water resources. This would improve the identification of relevant stakeholders that have common interests in the watersheds, and securing the availability of water resources (Francisco, 2002). When there is no adequate management of the water resources, depletion could lead to severe water shortages, as for example in the case of Negros' neighbouring island Cebu (see box 3.1).

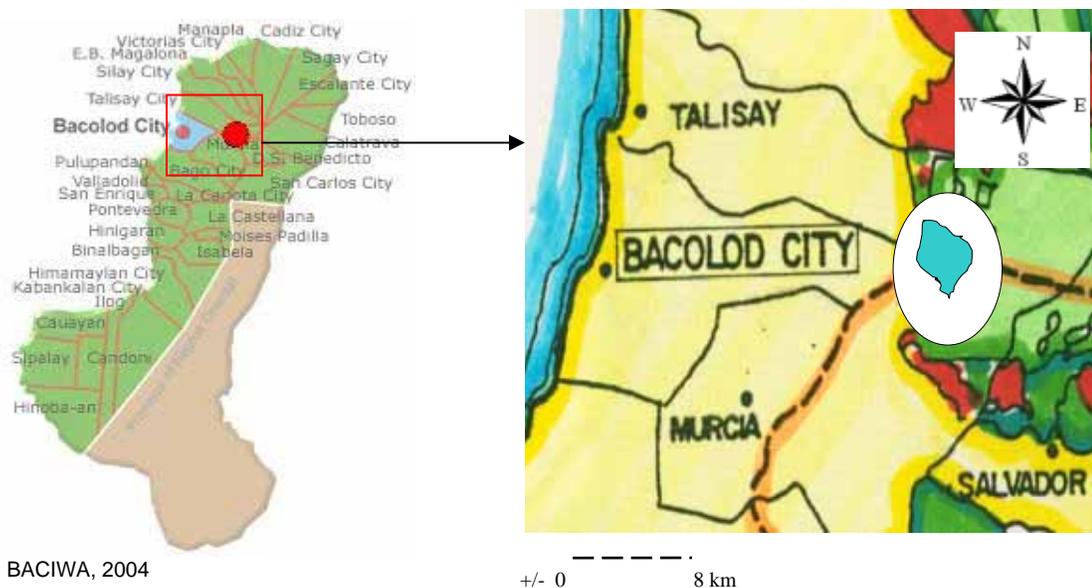
Currently the water pricing policy in the Philippines highly undervalues water as a scarce resource (Barba, 2000). As a solution to this problem it is suggested that, by estimating water fees, the cost of rehabilitating and protecting the watershed should be incorporated. These funds can then be used to secure sufficient water resources for future needs. The water districts play an important role in securing the sustainable use of water resources and incorporating the costs of rehabilitation and protection of watersheds into water fees. Higher water fees in turn could improve water conservation, secure sustainable water resources, improve the quality of water services (people pay more and thus could demand better service) and protect the environment.

²⁰ Cebu United for Sustainable Water - <http://www.cuswater.com/links.htm>

3.3 THE WATERSHED OF BACOLOD CITY

The groundwater supply is the main water resource for the residents in Bacolod City. The Bacolod City water district relies completely and only on groundwater resources. Watersheds play a critical role in ensuring the abundant supply of groundwater resources. For their water supply the City of Bacolod depends on their water to come from the upper Caliban-Imbang watershed area. In the past this watershed was named the Bacolod City watershed, but it is currently better known as the upper Caliban-Imbang watershed. The name of the watershed is derived from the two rivers (the Caliban and the Imbang River) which run through the area. The upper Caliban-Imbang watershed is situated 23 km east of Bacolod City and lays on the jump-off point to the Mandalagan and Marapara Mountain Ranges. It has an elevation ranging from 750-1500 m above mean sea level (BACIWA, 2004). There are four communities within the watershed area which divide the boundary of the municipality of Murcia and the City of Talisay (see Figure 3.2).

Figure 3.2: Map with the location of the Upper Caliban Imbang Watershed

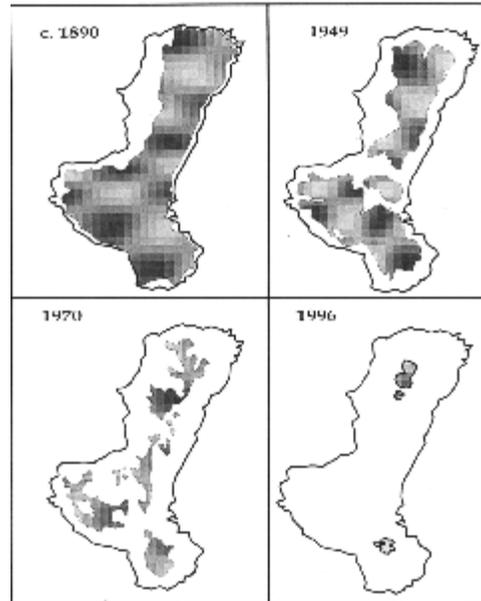


Source: BACIWA, 2004

The upper Caliban-Imbang watershed comprises a total land area of approximately 1000 hectares, which includes 500 hectare of primary forest. The whole area is part of the North Negros Forest Reserve (NNFR). Before the restoration efforts of a non-governmental organization (NGO) called the Negros Forest & Ecological Foundation Inc (NFEFI), the watershed was considered to be one of the most critical watersheds in the country (NFEFI, 2004).

A land use changes from predominantly agriculture gave way for urbanization, industrialization, high value crop farming, game fowl breeding as well as increased groundwater extraction. When the typhoon Nitang came over Negros Island in 1984 with great force, numerous lives and properties were lost. There was an immediate understanding that the ecological impact of over a century of forest destruction was partly the cause of this extreme impact of the typhoon Nitang (see figure 3.3).

Figure 3.3: Loss of primary forest in Negros Island



Source: NFEFI, 2004

After these events there was a clear need to take immediate action to prevent further destruction of the primary forest cover in the NNFR. In 1986 the NFEFI started efforts for community organizing at the then Bacolod Watershed area to protect and rehabilitate the forest. This was followed by a three year project for reforestation and agro forestry. The project was awarded to the NFEFI by the DENR.

For more than 19 years the NFEFI is trying to initiate environment projects within the watershed area in close-working relationship with members of the community and its organizations. However, in the area are many conflicting interests. The various stakeholders in these areas are predominantly the local villagers and their representative organization i.e. PAMB (regional), DENR (national), NGO's as well as the Republican Proletarian Army (RPA). In order to Implement programs in line with their visions, the NFEFI focuses upon the following subjects:

- Upland development of the Upper Caliban-Imbang Watershed Area;
- Biodiversity conservation and;
- Conservation education.

Special attention is given to the Upland Development of the Upper Caliban Imbang Watershed Area. The major components of the NFEFI programs in this area are:

- Community based resource management;
- Alternative technology;
- Advocacy and networking;
- Environmental defence;
- Environmental awareness education.

Through numerous programs and projects, the NFEFI was able to finance trainings and seminars for the communities in the watershed. The local water supply utility (BACIWA) also realized that it was important to protect and conserve the watershed area to ensure a sustainable water resource for future needs. That is why the BACIWA was involved in one of the projects of the NFEFI. From 1988 till 1991 the so-called BACIWA Management and Development project was implemented. Recently the BACIWA, in cooperation with various LGU's were involved in a project called the "adopt a mountain project".

Officially the BACIWA does not have any direct involvement in the management of the watershed area. After a former reclassification of the water districts, which was carried out by the LWUA, the BACIWA was typified as a large water district (see paragraph 3.2.3). This classification is based upon the BACIWA's gross receipts, the total fixed assets, net income before depreciation and interest, number of service connections, number of employees and nature of operation (LWUA, 2004). The BACIWA aspires to become a 'very' large water district. The very large water districts usually have a section for the management of watersheds. After the implementation of the phase III project, the BACIWA will most likely be labelled as a very large water district (see paragraph 3.4.1). In case the BACIWA will be reclassified to such a very large water district, they would be willing to develop a section designated for watershed management programmes.

Presently the BACIWA is extracting large amounts of water resources to provide the city with sufficient water supplies. While intensive use is made of the water resources, the actual users themselves are not involved in the protection of these sources. By including the BACIWA in the management of the watershed area, the costs of rehabilitating and protecting the Caliban-Imbang watershed can be incorporated into water fees. In addition to large amounts of water that are extracted by the BACIWA, the agricultural practices in the eastern parts of the city consume considerable amounts of water. Especially in the dry seasons, when rainfall is limited, and irrigation is required, large amounts of water is extracted. The main agricultural product of the area is sugarcane. Sugarcane is just about the worst crop choice in terms of water irrigation requirements (McIntosh, 2003). Alternative crops should therefore also be part of the solution for securing sufficient water resources for future needs.

At present the engineers of the BACIWA, as well as the reports from the NWRB show that, there are not yet real constraints as regards to the availability of water resources for Bacolod City. The rapid urbanization and increasing demand for water supplies of the residents of Bacolod City however could cause the available water resources to become scarce in a very near future. Several of the projects initiated by the NFEFI, and the goals of the BACIWA to develop a section for watershed management, are initiatives which could lead to a more sustainable use of the available water resources. A more integrated mechanism for adequate watershed and resource management, as mentioned in the previous paragraph, will also help secure sufficient safe water resources for future needs. The next paragraph will further introduce the works the BACIWA.

3.4 WATER SUPPLY IN BACOLOD CITY: THE BACIWA

This paragraph will introduce the local water utility system. The main subject of this paragraph is the supply of sufficient safe water to households in Bacolod City. The element of water supply can be related to the conceptual framework of household water security framework as part of the key element of water availability. In particular the distribution of water by means of a piped water supply system is of relevance in this paragraph. In addition, some attention will be paid to the other key element of household water security e.g. the household access to sufficient safe water supplies. In particular allocation principles, the affordability, the quality as well as a timely access to water supplies are of significance in the later part of this paragraph and the next paragraph.

On a city level there are several public institutions and departments responsible for household water supplies. The major responsibility for supplying piped water in a city as Bacolod is the water district, in this case Bacolod City Water District (BCWD). The BCWD is better known as the Bacolod City Water Authority (BACIWA).

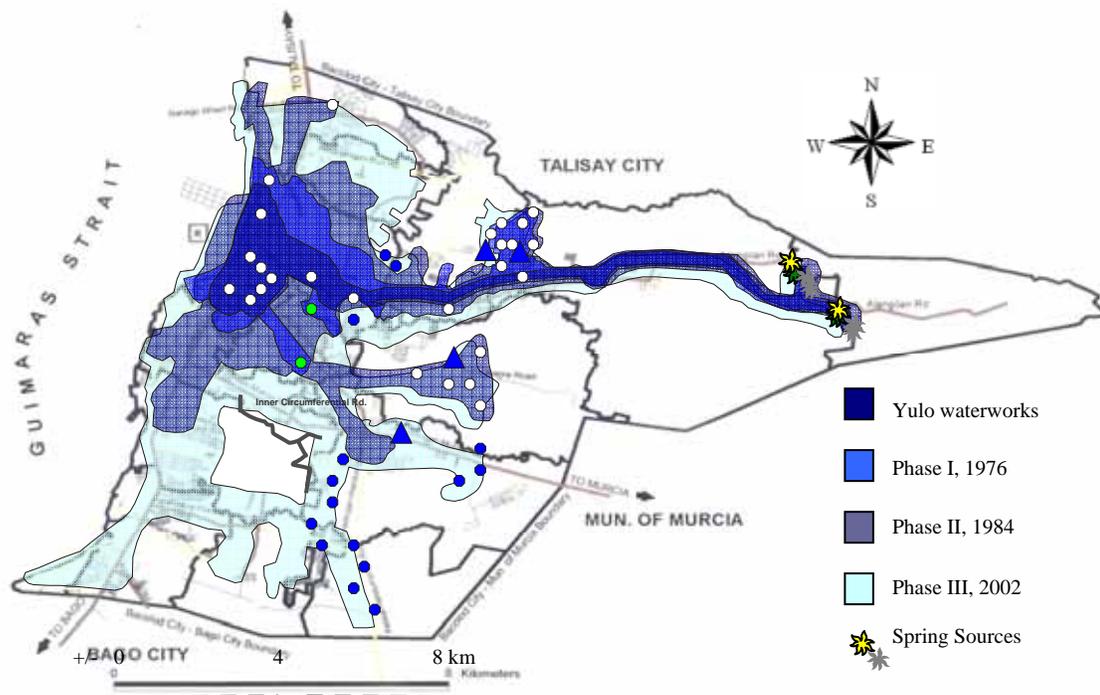
On a more regional level, several governmental departments are responsible for providing alternative water supplies i.e. the Departments of Public Services (DPS), the Department of Public Works and Highways (DPWH) and the City Engineers (CE). Local initiatives of barangay officials provide alternative (piped) water supplies as well. The security of water quality as for example the physical and chemical analysis of water are mainly performed by the Department of Health (DOH) in cooperation with the local Barangay Health Workers (BHW). This paragraph however will first introduce the functioning of the water utility system in the city of Bacolod i.e. the BACIWA. In the later parts of this paragraph the functioning of the other public agencies will be reviewed.

3.4.1 INTRODUCING THE BACOLOD CITY WATER DISTRICT

The main public institution responsible for the piped water supply in Bacolod City is the BACIWA. The official water supply system of Bacolod City was originally constructed in 1925 as the Yulo Waterworks. The system was at that time under the administration of the municipality of Bacolod City. By virtue of Republic Act 1383 in 1955, the management of the water supply system was transferred to the National Waterworks and Sewerage Administration (NAWASA). And, on August 10, 1965 the management of the system was eventually returned to the city government.

The current official water utility of Bacolod City was officially created on October 9, 1973 by means of the Sangguniang Panglungsod²¹ Resolution No 4460. The BACIWA then acquired from the original Yulo Waterworks: the Boro Boro and Bocal Bocal springs; eight deep wells with pump stations; a ground reservoir with a capacity of 3,788 cu m; and about 66 km of pipelines with appurtenances. Improvement Programs, named Phase I (1976) and II (1984), and the recently initiate Phase III program, have been instigated to expand this system in order to answer the growing demand for water supplies (see also Figure 3.4).

Figure 3.4: Coverage Bacolod City water utility system according to the Phase I, II and III developments programs.



Source: BACIWA, 2004

²¹ city council

The phase III project was initiated to meet the increasing demand for water supplies in the city of Bacolod. This improvement and development project was officially initiated in 1994 when the BACIWA contracted CEST Inc. to carry out a feasibility study. However, at that time there was no sufficient funding for the implementation of the project. Along with six other water districts the BACIWA was eventually approved a LWUA loan for the phase III improvement and development plan. The LWUA acquired the funding for this loan from the then Overseas Economic Cooperation Fund (OECF) of Japan (since 2000 incorporated into the Japan Bank for International Cooperation (JBIC)). Other than extending the system with twelve more deep wells, the phase III project also included the construction of a 6,500 cu m ground reservoir; the construction of several new chlorination facilities; and the laying of approximately 113 km's of pipelines. The expansion program will provide additional water supplies to the existing service areas and includes coverage of new service areas i.e. barangay Sum-ag, Handumanan, Punta Taytay, Alijis and Vista Alegra.

3.4.2 PRODUCTION CAPACITY

Currently the BACIWA utilizes 2 spring sources (the Bocal-Bocal and Boro-Boro spring sources) and a total of 30 deep wells (28 are actively used), which are utilized by 6 diesel and 24 electric driven pumping stations to extract groundwater sources (as of April, 2004). The BACIWA does not make use of surface water sources, because the groundwater resources are less contaminated, and the system of extraction is cheaper. Maybe in the future, it will be necessary to tap the surface water when groundwater sources are declining. This highly depends on the spread and availability of the groundwater resources as well as the renew-ability of the aquifers.

There are only a small number of wells that have needed a permit from the NWRB. It should be noted that a permit for the NWRB is only needed if the casing²² of the well that is to be drilled has a diameter of 4 inches or more. The average diameter of the casing of the BACIWA wells is around 8 inches and can reach a dept of 100-200 m. There are a total of 21 private and 40 water district wells (including the planned wells) listed in the Bacolod City district. The majority of the wells drilled in Bacolod City do not exceed the regulatory restriction. The listed private wells which have a casing of 4 inches or more are predominantly for industrial or commercial use.

For the distribution of water to the households the BACIWA is currently utilizing approximately 413 km of pipelines of various sorts and sizes (from 600mmØ - 50mmØ pipes of CCI, Steel and PVC)²³. There are also several storage facilities, of which a combined total of 15,136 cu/m are ground reservoirs, 143 cu/m elevated tanks, several spring intake boxes and sedimentations basins. On several locations, various sorts of chlorination facilities (gaseous, dry or liquid) are installed to purify the water.

The eastern part the city is elevated at approximately 70 m above sea level, and tapers to 3 m above sea level near the coast. Most of the deep wells, as well as the two spring sources, are located in the eastern part of the city i.e. barangay Granada, Alangilan and Loygoy (see figure 3.6). The flow of the water in the waterlines is created by the natural pressure. Because of the many electric driven pumping stations, there is less water flowing through the system during brownouts, causing low pressure. Therefore, in the phase III plan there are three boosting systems included to ensure sufficient pressure at all times.

²² The material that is used to keep the upper portion of the well stable

²³ centrifugally cast iron (CCI) and Polyvinyl Chloride (PVC)

By constantly expanding and improving the service system the BACIWA has managed to increase their effective production capacity over the years. As of 2003 the BACIWA has a total capacity of 15,114.24 million cu m per year. Although the effective production is increasing, there is still a high percentage of non-revenue water. In addition, the question remains if the BACIWA can keep up with the rapid population growth of Bacolod City. The next part of this paragraph will focus upon the non-revenue water as well as the current coverage of the BACIWA service system.

3.4.3 NON REVENUE WATER (NRW)

First it should be noted that there is a difference between accounted non-revenue and unaccounted for water. Non-revenue water is the water that is used for fire fighting, repairs of leakages, flushing, free water given to donors of facilities etc. This water can be accounted for; however the BACIWA does not earn revenue for it. The 'unaccounted for' water is attributable to leakages, illegal connection, understatement in the readings, defective flow meter reading etc. This 'unaccounted for' water is what is left after deducting the non-revenue water. For the unaccounted for water the BACIWA does not earn revenue from either.

The total Non-Revenue Water (NRW) of the BACIWA has increased from 28 percent in 1994, to 35 percent in 2003. The main cause of the increase and high percentage of NRW is the old age of the water supply system which is showing leakages. Especially the pipes coming from the spring sources as well as the spring reservoirs lose nearly 50 percent of the water coming through the pipes. In addition these two spring sources supply approximately 20 percent of the total production, however a large proportion of this water is thus lost. Other problems causing the high percentage of NRW are the spaghetti connections, the numerous illegal connections and illegal tapping from water lines (see figure 3.5). This occurs for the most part in the urban areas of the city. The BACIWA has several programs to reduce leakages and apprehend illegal connection to reduce the NRW. Thereby the BACIWA also regularly checks the measuring facilities and there are several major improvements in the flow metering systems.

3.4.4 SERVICE AREA AND ORGANIZATION STRUCTURE

Though the number of connections to the BACIWA system in absolute numbers has increased over the past years, the coverage of service system in Bacolod City is still only minimal. It is estimated that roughly 30 percent of the total number of household in the city is actively served by the BACIWA. In the poblacion (city centre) or urban barangays an estimated 29 percent is actively served by the BACIWA. In the rural barangays the BACIWA covers an even lower percentage. In these areas an average of only 25 percent of the households is actively served. The rural barangays Cabug, Felisa, Handumanan, Punta Taytay and Sum-ag are not even connected to the BACIWA service system. The above mentioned phase III improvement and development plan should expand the coverage to these barangays as well. When the phase III project is implemented, approximately 50 percent of the total population should be served by the BACIWA.

In line with the Supreme Court decision of 1991, the Bacolod City Water District as well as all the other water districts in the country, is legally termed a quasi public, non profit corporation that operates autonomously and without interference from the LGU. The BACIWA is therefore functioning as a self-sustaining organization. The following part of this paragraph will look at the structure of this organization.

Figure 3.5: a) Spaghetti connection of BACIWA lines; b) Illegal water tapping in the city of Bacolod.



Source: left: BACIWA, 2004; right: the author.

The Board of Directors of the BACIWA contains 6 members. In addition the water district is staffed with one General Manager, which is assisted by the Assistant General Manager of Operations and the Assistant General Manager of Administration. In regard to operations i.e. the engineers, production and maintenance department, there are in the order of 44 casual and 88 permanent employees (est. June 2004). At the administration, finance and commercial departments there are around 23 casual and 98 permanent employees (est. June 2004).

This would mean that there are approximately 253 people working at a water utility system that serves roughly 183,000 and have 24,541 connections (BACIWA, 2003). This makes a total of 10.3 employees on every 1000 connections. This can be set against the 2.0, 2.3 and 2.8 employees per 1000 connections in respectively Singapore, Seoul and Hong Kong. The next part of this paragraph will look at the services provided by the BACIWA as regards the water rates, water quality and the costs of household connections.

3.4.5 WATER RATES

Recently the BACIWA has been receiving public criticism since they have announced to increase their water rates over the upcoming years. These increases can reach up to 18% in the year 2004 (see table 3.1). The water rates of the BACIWA are structured according to the water rate system of the LWUA. The LWUA promotes the full-cost pricing method in which all costs of treating and delivering the water to the customer will need to be accounted for. The water rate is generally determined by the cost of system expansions; operation and maintenance costs; number of connectors; debt service needs of the water district; and ten percent reserves (LWUA, 2004).

The LWUA is promoting equitability and socialized pricing as well as affordability. As regards to affordability the LWUA has asserted that 10 cu m per connection will be adequate for the basic requirements of a household. The minimum charge for a ½" inch residential connection should not exceed 5% of the average income of the low income group in the area. In reference to the water price increases in the city of Bacolod, the BACIWA claims that the proposed water rates are affordable because these are still below the 5 percent income allocated for water of the average income of the residents in region VI. Thereby the BACIWA states that the consumption of the heavy users subsidizes the low income group users because of the socialized billing rates that are implemented.

Table 3.1: Historical development of the BACIWA water rates.

Year / consumption	1988	1991	1996	1997	1998	1999	2000	2003	2004	2005
Min Charge	47.00	47.00	61.00	66.00	80.00	88.00	113.00	129.00	151.00	173.00
11-20 cu/ m	3.00	4.70	6.10	6.60	8.15	9.00	11.60	13.20	15.55	17.80
21-30 cu/ m	3.15	4.85	6.30	6.80	8.50	9.35	12.00	14.00	16.50	18.90
31-50 cu/ m	3.55	5.05	6.55	7.10	9.70	10.80	13.90	15.85	18.75	21.45
51-70 cu/ m	4.05	5.55	7.20	7.75	10.75	12.60	16.25	18.50	21.85	25.00
71-100 cu/m	4.70	6.40	8.30	8.95	11.90	14.90	19.20	21.85	25.75	29.50
101-up	5.50	7.45	9.70	10.45	14.30	17.90	23.00	26.20	30.85	35.50
Average % increase		35%	30%	10%	26.21%	10%	28.41%	15%	18%	15%

Note: Charges apply only for a ½ " inch domestic connection; Inflation has not been taken into account.

Source: BACIWA, 2004

3.4.6 SECURING WATER QUALITY

The quality and safety of the water provided by the BACIWA is also subject of public criticism. There are several problems with bad odours and bad taste of water. Especially elevated areas experience problems. The identified elevated areas in Bacolod City are barangay Taculing, Monte Vista and Singcang. They are experiencing problems with low pressure, bad smell coming out of the pipes and several other symptoms inherent with the end of channel syndrome. The households in these areas only have 6-8 hours / day access to water. During the other hours, which are predominantly at night and at times of high water use (i.e. after 9 am when water use increases), these households experience low or no pressure.

In many cases the problems as regards to the smell and bad taste of the water lay in the pipelines. In these pipelines sediments have accumulated over a number of years. The major problems are the iron bacteria in the pipes and the oxidation of the chlorine which is used to purify the water. This problem is addressed by the BACIWA by means of regularly flushing of the pipes in all areas. The BACIWA however states that the water used for domestic consumption does meet the requirement to be safe for a person's wellbeing.

In general water should be clear, colourless, free from unpleasant taste and odour, as well as free from substance organisms, chemical or radioactive material at a specific level of concentration. The current parameters for these substances are set by the Philippine National Standard for Drinking Water (NSDW). For the treatment of the water in Bacolod City various chlorination facilities which are installed at strategic locations in the water system are operating. To secure the safety and quality of the water in the BACIWA water supply system there is an average of 560 water samples a month gathered and tested in compliance with the NSDW. In so doing monthly reports are given to the LWUA and the city's Department of Health (DOH). The BACIWA's Quality Control Laboratory service analyzes parameters for the bacteriological quality of the water. For the physical and chemical quality checks, samples need to be sent to Metro Iloilo Water District.

3.4.7 BACIWA POLICY OF HOUSEHOLD CONNECTIONS

The BACIWA service system is expanding and there is an absolute growth of the number of connections in the city of Bacolod. The new service connections to the BACIWA system have to pay an installation fee (see table 3.1). These installation fees differ according to the water meter size. The standard ½"inch diameter water installation costs are approximately 3,000 php. This installation fee includes 6 meters of PB or PE tubing (15 meters if on a crossroad), a water meter and additional connection components.

After the first application for a household connection (following the requirements), and the payment of the investigation fee, a set of application forms will be issued. The BACIWA will investigate the location and the applicant. After the application is fully completed, it will take approximately one month for the new service connection to be installed and activated. As a general rule the installation charges need to be paid before the actual connection will be activated.

Table 3.2: New service connection installation charges for residential connection in php.

Water Meter Size	½"	¾"	1"	1 ½"	2"
Investigation Fee	120	120	120	120	120
Installation Fee	2,780	3,800	6,390	19,520	36,390
Notarial Fee	100	100	100	100	100
TOTAL	3,000	4,020	6,610	19,740	36,610

Source: BACIWA, 2004

The low income households however often can not afford to pay the installation charges, not even for a basic residential connection from the BACIWA. That is why the BACIWA is striving to make the installation fees more affordable. A new scheme was developed for the low income households, predominantly for the residents in the new service areas of the phase III project. This scheme is made up out of a three stage payment. The applicant pays 1,200 php on application, and the remaining balance has to be paid through the first two bills in the following two months.

A common problem with the initial household connection to the BACIWA system is the location of the house and the requirements needed by the new applicants²⁴. As regards the location the households that are for example located on the other side of the street in reference to the point where the main waterline is located, these households have to pay for the additional costs to connect to the line. This is also the case for households that are located far from the main lines (see box 4.1). In many cases these additional costs determine if a household can or cannot be connected to the BACIWA services.

For the requirements needed by applicants of a new connection there are variances according to the status of the applicant. Since 1998 the BACIWA has added the requirement that the owner of the land has to give permission for a connection in the application form. This was added to the requirements because of the problems and complains of land owners. In many cases, when squatters were connected to the BACIWA system, the land owners often had additional problems with the eventual evacuation of the squatters on his property. Another problem was the fact that when the squatters did not pay their bills and then left the land, the land owner became responsible for the debt payments to the BACIWA. In many cases the payments of the debts were only partly made. These situations are not wishful for both parties.

The BACIWA has alternatives for squatters and households that cannot afford to get an individual connection to the BACIWA due to for example the requirements, financial reasons or the location of the house. They offer community faucets which should be managed by the barangay. In regard to the community faucet the BACIWA would ask the residential rate since the governmental rate (for the barangay) is the same as the residential rate.

²⁴ Requirements may vary according to the status of the applicants. For residential connections this varies according to:

- A.1 Lot Owner (Owned Property)
- A.2 Urban Poor / NHA or ACCO Housing BHA
- A.3 Private Property (Squatters) – Can Locate / Reach Owners
- A.4 Government Property (Public / Private) – Cannot Issue Consent
- A.5 Urban Poor with Association

There are several cases in which community organizations have been given the management of a community faucet. However, when the communal connection is used to connect individual houses, the BACIWA will charge the bulk rate, which is three times higher than the regular rate on household connection. The problem with these communal faucets (as well as with some faucets which are managed by the barangay) is that the payments to the BACIWA are not always made. The collection of the fees for the use of the communal faucets by residents has proven to be difficult. When the payments are not made, the BACIWA will disconnect the communal faucet.

Occasionally individual households are disconnected from the services of the BACIWA as well. These household in general do not pay their bills or have exceeded the maximum debt of 1,000 php. This is primarily caused by the inability of the households to pay their bill or willingness to go and pay the bill. The BACIWA has constructed collection offices in various barangays in the city to make the payments easier. It is now also possible to make the payments through several banks. These measures should help increase the revenue collection of payments. In addition, a discount of 5 percent is given when the bill is paid before due date. This should stimulate the household to pay on time. The households that have been disconnected for more than 15 days, special procedures must be followed. Other disconnections are issued by illegal connections, violations of terms and conditions or just a simple request for disconnection. When people are disconnected from the BACIWA system, they have to depend on alternative sources for their water supply. The next part of this chapter will examine these alternative public water supplies, as well as the alternative private water supplies available in Bacolod City.

3.5 WATER SUPPLY IN BACOLOD CITY: ALTERNATIVE SUPPLIES

The BACIWA only supplies approximately 30 percent of the city with potable piped water. This means that the other 70 percent of the residents of Bacolod City are utilizing alternative water supplies. These alternative water supplies fit in the conceptual framework of household water security in the same manner as the water supply discussed in the previous paragraph i.e. the distribution and allocation principles (see figure 1.2). The two key elements of water availability and accessibility to the available water supplies are thus main subjects in this paragraph.

The majority of the alternative water supplies are provided by public agencies i.e. the DPWH and the CE. There are however several private organizations that provide safe drinking water as well. In regards subdivisions, the developers are responsible for providing water supplies. Other households have the option of buying bottled purified water, or use the water from a private deep well. Some use their personal dug well for domestic water supplies and others just buy water from peddlers or households that do have a connection to the BACIWA. In the first part of this paragraph the alternative public water supplies, provided by the Department of Public Works and Highways (DPWH) and the City Engineers (CE) will be introduced. The agency responsible of securing the quality (CHO) of these alternative water supplies will be reviewed in the second part. The last part of this paragraph will deal with the above mentioned alternative private water supplies.

3.5.1 THE DPWH AND THE CITY ENGINEERS (CE)

Although the BACIWA is the main public institution that is responsible for providing the piped water supplies in the city of Bacolod, there are several other governmental departments assigned the task to provide communities with sufficient safe water supplies. In the case of Bacolod City, the provincial Department of Public Works and Highways (DPWH) as well as the City Engineers (CE) construct alternative water supplies in addition to the services of the BACIWA. While the BACIWA provides communities with mainly level 3 water services, the DPWH and the CE construct mostly level 1 water services i.e. artesian wells or community water systems (see paragraph 3.1).

Water is a basic need and providing water to every household is part of the National and Bacolod City's social program. There are two large governmental departments that are responsible for providing the water supplies to these households not covered by the local water utility system. Financial assistance for these projects comes from the several funds and budgets of the departments. When the funding comes from national level, the DPWH will implement the project it is assigned for. When the funding comes from the city office, the CE will implement the project.

Usually the DPWH provide mainly level 1 point sources, specifically deep wells with hand pumps. In some cases they also install level 2 systems with a communal faucet, including a pipe distribution system. As Bacolod City is highly urbanized, this particular department of the DPWH only covers the area of the city. Other departments of the DPWH in the province can cover several municipalities. The DPWH in Bacolod City is however only a small department that does not have a very large budget. A large part of the budget goes to other project than the provision of water supplies i.e. infrastructural developments. Thus, the DPWH only installs a few hand pumps a year. In the first five months of the year 2004 the DPWH provided and installed only 61 hand pumps across the city. And when the budget allows for it they can provide assistance by installing a communal faucet.

When a hand pump needs to be installed by the DPWH, the barangay captain²⁵ usually contacts the DPWH with the request to install a hand pump in the barangay. When this request is accepted, engineers of the DPWH coordinate with the barangay or purok officials for the location of the hand pump. The main problem for the DPWH is that they do not always have the resources to implement the projects. In that case they have to hire external personnel and equipment, which make the instalment of the hand pump more expensive.

The DPWH only installs jetmatic hand pumps (see figure 3.8), because they are easy to install and most suitable for the shallow wells (dept of 36-40 meters). These jetmatic hand pumps are not too expensive and are fairly easy to repair. But, the jetmatic hand pump has proven not to be very sustainable. There have been many complains about the quality of the jetmatic hand pumps.

Figure 3.6: An example jetmatic hand pump



²⁵ The barangay captain is the head of the barangay council

According to the DPWH there is no apparent coordination with the other departments that provide water supplies. Only in cases of possible affects of these departments on the works of the DPWH, other departments have to coordinate with the DPWH. The same goes for the CE, who in the rule have to coordinate with the LGU, but acknowledge that this is not always the case. The CE however does communicate with the BACIWA in regard to their well drilling operations. Better cooperation with the BACIWA, as well as with the LGU's, is desirable for both departments.

The City Engineers provide level 1 water sources in the form of hand pumps as well. The CE are often facilitating the implementation of alternative water supplies. As regards to water supplies, the installation of hand pumps is their main activity. Occasionally they supply level 2 water systems. For example recently the CE installed a level 2 water system in barangay Alijis. As the DPWH, the CE does not have the resources to implement the actual installation of the hand pumps. They have to recruit external personnel and equipment. The CE predominantly provides the materials. In the year 2003 they have installed approximately 450 hand pumps (including replacements which require no drilling). Estimated from the year 1989 until May 2004 the CE claim to have installed a total of 3,128 hand pumps in Bacolod City.

When a barangay official wishes to install a hand pump in a particular area, he/she needs to file a request at the City Mayor's Office. After approval of the Mayors Office the CE will explore the location and estimate the feasibility, which is often based upon the knowledge of the local residents. This method has proven to have some defects. In some cases there has been a well drilled, but there was no water coming out of the well. In all cases the CE install a jetmatic hand pump (see figure 3.8). They often drill a well with a dept of approximately 18 m. One of the main problems is that in many areas in the city 18 meters is often not deep enough to deliver potable water. Another main problem occurs when they dig near a water body. The water from these wells is often not potable or salty. After the completion of a functioning hand pump the CE are also responsible for the maintenance. However, in many cases the people do not want to wait for the problem to be fixed by the CE, and repair the pump themselves. They usually find a local representative who then will be responsible for the monitoring of the hand pump.

The DPWH and the CE provide alternative water supplies in areas that are not covered by the BACIWA. Though, in some cases even these governmental departments have problems providing sufficient safe water supplies. In regard to the installation of hand pumps on private land on which squatters have made their resident, permission from the land owner is needed to drill a well and install a hand pump. Sometimes the CE do not ask permission of the land owner when they install a hand pump. The presence of squatters makes them drill a well and install a hand pump in any case, especially if there is a need for water supplies. When the owner of the land comes to claim his land, they could render the well non-functional. There are exceptional cases where the owner did not allow the CE to drill a well. In other cases there are problems with the budget.

Only a small percentage of both the DPWH and CE their budget is utilized for the provision of water supplies. In addition, both departments lack resources to implement the actual installation of the hand pumps. This has forced households that do not have access to the BACIWA service system or adequate water supplies from a nearby hand pump to look for other sources. These sources are discussed in the last part of this paragraph. First, the methods for securing the quality of the water from the alternative water supplies need to be reviewed.

3.5.2 WATER QUALITY AND THE CITY HEALTH OFFICE (CHO)

The quality of the water from the hand pumps provided by the DPWH or the CE is generally tested after completion of the installation. The department in charge of testing the safety of the water is the City Health Office (CHO). After the first test of water quality, the barangay takes over the responsibility of securing the water quality over time. Sometimes the CHO put chlorine into the pipes of the hand pump to disinfect. This however does not always secure the quality of the water over time. Regular testing with water samples taken from the pump is therefore advised.

The CHO is responsible for checking the quality of the water from a wide range of sources. There are 18 sanitary inspectors, which are often aided by the Barangay Health Workers (BHW) in checking the quality of all the public water sources. Every sanitary inspector has the responsibility over 2 or 3 barangays. They check the quality of the water every 6 months. Samples are collected via a special method given by the Philippine National Standard for Drinking Water (NSDW). The water is predominantly tested for coli form organism. If the results were negative, the water is potable. Of the 684 water analyses performed in the year 2003, there were 175 (25.58%) that turned out positive for coli form. For all the public water sources these checks of the water quality are free of charge. When the owners of private water sources ask the CHO to check the quality of the water coming from their sources, they need to pay 100 php research fees.

In case of a public water supply, the sanitary inspectors regularly disinfected the hand pumps to ensure the safety of the water. In cooperation with the BHW, the inspectors are to inform and educate the people on the quality and use of water as well. The most common deceases as regards the water quality within Bacolod City are typhoid fever, diarrhoea, hepatitis A, Amoeba and various parasites. According to the CHO the water of Bacolod city in general is very much potable.

There is one very important advice the CHO gives to all residents of Bacolod City, and that is that they should not store water for more then one day. This could influence the quality of the water, and be a danger to ones health. And although there still is a high percentage of tests that turn out positive in the bacteriological exams, they still claim that there are no real problems with the quality of the water in Bacolod City. In case that people do not trust the water from the hand pump or from the BACIWA, there are always other alternative water supplies available. In the next part of this paragraph these other alternative water supplies will be introduced.

3.5.3 DEEP WELLS, DUG WELLS, PEDDLERS AND PURIFIED/MINERAL WATER

When a household is not connected to the BACIWA service system, and there are no adequate water supplies provided by the LGU, DPWH or the CE, the people are forced to make use of alternative, mainly private water supplies. In some cases the households have the financial means to construct their own deep well and install a hand pump or electric pump. It's even possible to install an elevated reservoir or pressure tank with the in-house piped network to distribute the water to the point of use in house. The more well-off households have these water systems, often as a back-up for when there are brownouts and/or the BACIWA cannot provide the household with potable water. These wells can be drilled without permission from the water district or any other governmental department, provided that the well is drilled on private property and the casing of the well does not exceed the diameter of 4 inches.

Figure 3.7: a) An example of a dug well; b) Peddler filling containers at water pump. These containers will be sold to the households that do not have a potable water source near their home.



Other sources used to access a water supply are the traditional dug wells (see Figure 3.7). These wells are still available all across the city and mainly used for other purposes than drinking e.g. washing, bathing, cleaning etc. The water in these dug wells is often not very potable, and thus cannot be used for drinking. Another important alternative in the city of Bacolod are the water peddlers. These peddlers sell potable water to the households that do not have a potable water source near the house. With their trisikad or tricycle they bring containers of approximately 5 gallons of potable water to the households. The water sold by these peddlers can come from various sources. There are peddlers that fill the containers with water from the hand pump (see figure 3.7). Other peddlers buy water from households that have a connection to the BACIWA or a private well with reservoir. There are peddlers that buy their water from refill stations as well. More on the water supply from peddlers can be found in the next chapter.

Refill stations sell purified drinking water. According to several sources there has been a recent growth in the number of households that buy and prefer to use purified drinking water. The popularity of purified drinking water is reflected in the number of listed purified/mineral water businesses. In 2000 there was only one refilling station listed in Bacolod City. This has grown extensively to 46 listed refilling stations in 2001. In the year 2002 there was a decline to only 34 listed businesses selling purified/mineral water. The following year however this number increased again up to 42 businesses. In July 2004 there were already 41 listed businesses selling purified/mineral water.

The increase of businesses that sell purified water is thought to be caused by the higher standards people have acquired in reference to the quality of their drinking water. The costs of these alternative water supplies are however much higher than the costs of all the other alternatives. A container of 5 gallons can cost from only 15 php up to around 150 php. Some refill shops can keep the prices low because the household have to come to the shop and refill their container there. However, in other cases the refill station will deliver the containers to the households. These services are very common used by the well-off households.

To conclude it can be stated that the public and private alternative water supplies for households that are not connected to the BACIWA are often not very reliable and frequently have a substandard quality. Unless the household has the option to obtain a private water supply system or regularly buy purified water from a refilling station, they have no choice but to use the substandard public or private water supplies. The last paragraph will summarise this chapter, as well as give a short introduction on the next chapter.

3.6 SUMMARY

In this chapter the subjects of water supply and distribution i.e. the key element of the availability of water is reviewed on a national and a city level. In the first paragraphs of the chapter the national policies and agencies in regard to the water supplies have been evaluated. The three most important agencies that are reviewed in this thesis are the NWRB, the LWUA and the water districts. In particular the Bacolod City water district (BACIWA) has been of importance. This water district is responsible for the supply of piped water to the households in the city of Bacolod. The second part of this chapter reviewed the BACIWA in more detail.

The main subject in the second part of this chapter was the availability and management of water resources in the city of Bacolod. In the first place it needs to be stated that at present there are no real problems as regards the availability of sufficient safe water resources in the city of Bacolod. However, in for example the neighbouring island of Negros i.e. Cebu the inadequate management, unsustainable uses of water resources and their destructive land use changes have caused severe water shortages (see box 3.1). Thus without adequate management of the current water resources and the catchments areas, securing sufficient safe water supplies for future needs can become a serious problem.

In the subject of water resources explicit attention is given to the management of watersheds to secure sufficient safe water supplies for future needs. For the availability of sufficient water resources, Bacolod City primarily depends upon the Caliban-Imbang watershed. A mixture of land use changes, destructive cultivation practices and large scale deforestation in the Caliban-Imbang watershed already has severely damaged the watershed area. The watershed is considered to be in a critical condition. By means of development programmes, in particular initiated by the NFEFI, there are already many efforts to protect and rehabilitate the watershed area. In addition the BACIWA is strengthening their position in safeguarding the water resources by joining the NFEFI in these efforts to protect and rehabilitate the watershed area. It can be concluded that, even though at present there are no real problems as regards the availability of water resources, there is a considerable threat of future water shortages.

To conclude this chapter the last two paragraphs have examined the household water supplies in Bacolod City. Approximately 30 percent of the households in Bacolod City have the possibility to receive piped water supplies from the BACIWA. The majority of the residents in Bacolod City however still depend on alternative water supplies. These alternative water supplies are often provided by public agencies as for example the DPWH, the CE, or the LGU. Because the alternative public water supplies are not always sufficient, the private sector also provides the residents of Bacolod City with water supplies e.g. a subdivision water systems, refilling stations, peddlers etc.

In this chapter the available water supplies of the city in general have been examined. It can be concluded that there is a broad range of water supplies available in the city of Bacolod. However, the next step is to find out: which water supplies are actually used by the households in squatter areas, what are the perceived qualities of these water supplies, as well as the actual access to the available water supplies. Several interviews were performed on a household level. These household interviews were performed in a number of case study areas. The focus of the research was upon households living in the squatter areas of Bacolod City. The findings of the case studies are specified in the next chapter.

4 THE CASES: HOUSEHOLD WATER SUPPLY

This chapter will deal with the subject of securing a sufficient safe water supply at the local and household level. In addition to the actual supply of water, the elements of access to the available water supplies and the actual use of water will be examined. These key elements of household water security are examined in five case study areas.

Don't empty the water jar until the rain falls.

- Philippine proverb

4.1 INTRODUCTION

The previous chapters have introduced the general settings of the research and reviewed the availability of water supplies on a national and city level. This chapter will examine the availability, access and use of water supplies on a more local and household level. The large part of this chapter will look at the water supplies on local and household level in five different case study areas. The three subjects of availability, access and use of water supplies, which are the three underlying principles in the conceptual framework of household water security, are used as a guideline in the research (see figure 1.2).

The second paragraph of this chapter will start with a general description of the respondents and household characteristics in the five case study areas. After introducing the household characteristics, the available water supplies in the case study areas are examined in more detail in paragraph three. In accordance to the conceptual framework of household water security, the availability of a water supply is reviewed by looking at the resources available. The available resources are divided according to two main household water usages i.e. the sources that are used as a drinking water supply, and the water sources which are used for all the other domestic purposes as for example washing, cleaning, bathing etc.

In the remainder of this chapter attention is given to the physical access to a water supply, as well as meeting safety standards and appropriate use of a water supply. These subjects represent the other key elements of the conceptual framework of household water security i.e. the access to, and use of a water supply (see figure 1.2). In this research the access and use of the available water supplies are first examined according to the preferences of the household and the quality of the water supplies households have access to. In the last paragraphs the proper consumption and use as well as the willingness and ability to pay for improved water supplies (in this case a piped water supply from the BACIWA) are reviewed in more detail.

The reader should keep in mind that the data gathered in the survey and presented in this chapter, is primarily used for descriptive purposes and is not representative for the barangay's or the city as a whole. The reader should further keep in mind that the data presented below is not without errors or biases. These errors and biases have been outlined in the first chapter and will be discussed in line with the examination of the data. In addition to these details it should be noted that the survey was conducted during the dry season and at the start of the rainy season. Therefore the results of the survey could be seriously influenced by the seasonal differences that are inherent to water supplies. Precaution with the use and interpretation of these figures presented in the chapter is thus recommended. First the general respondent and household characteristics in the survey areas will be examined.

4.2 GENERAL RESPONDENT AND HOUSEHOLD CHARACTERISTICS

In the second chapter of this thesis the settings of the barangays as well as the puroks, have already been illustrated. In addition to these descriptions there are some results of the survey which can be used to illustrate the characteristics of the respondents and the households in these puroks (see table 4.1). The questionnaire in the survey contained several general questions on the characteristics of the respondent and the household unit (see appendix 3). The figures of these general characteristics can be used to evaluate the presumptions and compare the case study areas.

The first thing that might come to mind after looking at the figures which are presented in table 4.1 is that the sample sizes per purok differ to a great extent. These differences have been caused by the lack of knowledge on the number of residents in the research areas before the implementation of the research. It should also be noted that, even though that in table 4.1, as in several other tables in this chapter, the figures of Kapawa, Masipag and Paraiso are combined under the heading of Punta Taytay, this figure however does not correspond with, or is representative for the actual situation in barangay Punta Taytay.

As illustrated in table 4.1 there were a large percentage of female respondents in the survey areas. This can be partly assigned to the time of visit to the research areas. Another factor that could have caused this high percentage of female respondents might be the fact that most of the men were not willing or able to answer questions in regard to the water supply. The female members of the household were the main users of water supplies, and therefore better able to answer the questions asked in the survey.

The average age of the respondents is estimated at approximately 43. In all puroks, apart from purok Kapawa, the average household size was higher than the average household size in Bacolod City (which was 4.91 persons per household - SEP, 2000). This however does not necessarily mean that the households in the case study areas have a higher average household size than other areas in Bacolod City. There are many explanations for the occurrence of this difference, for example the date of measuring or the sample size.

Table 4.1: General respondent characteristic per purok

	Kapawa (n=20)	Masipag (n=20)	Paraiso (n=20)	Punta Taytay (n=60)	Magnolia (n=30)	Sawmill (n=30)
Total number of households*/ sample size	84 24%	79 25%	89 22%	252 24%	200 15%	346 9%
% Male / Female	20 / 80	10 / 90	30 / 70	20 / 80	27 / 73	43 / 57
Average age respondent	40.9	44.6	43.3	42.93	43.5	43.43
Average household size	4.75	6.25	5.05	5.35	5.93	5.63

*Estimated by the Barangay Officials
Source: questionnaire

This research also intended to identify the poverty incidence in the case study areas. The National Statistics Office in the Philippines measures poverty incidence by using an estimated threshold for household income. This threshold represents the minimum monthly income necessary to meet basic food and non-food requirements per household (see also chapter 2.2.3). The poverty threshold for the province of Negros Occidental, as well as for Bacolod City, was set at 11,113 php a month (NSO, 2000). In line with these measurements of the NSO, this thesis also used the minimum income threshold to determine the poverty incidence in the case study areas. The results could then be compared with the NSO figures.

Due to the results of the pilot, which was preformed before the implementation of the questionnaire, it became clear that many household had some problems with estimating their average monthly household income. Most of the household did not have a fixed income. Because data on the average monthly income was required to measure the poverty incidence, the respondents were asked to estimate their average monthly household income into five income categories (see table 4.2). This turned out to be much easier to estimate for many of the respondents. The last two household income categories constituted the larger part of the households that have an income which is higher than the poverty threshold given for Bacolod City. At least 80 percent of the respondents have estimated that they have a monthly income that is much lower then the given poverty threshold.

Table 4.2: Percentage of respondents divided in an estimated monthly household income category per purok.

%	Kapawa (n=20)	Masipag (n=20)	Paraiso (n=20)	Punta Taytay (n=60)	Magnolia (n=30)	Sawmill (n=30)
< 1000	25	0	5	10.0	23.0	3.3
1,000 - 4,999	35	70	65	56.7	36.7	43.3
5,000 - 9,999	20	5	20	15.0	23.3	43.3
10,000 - 14,999	15	20	5	13.3	16.7	6.7
> 15,000	5	5	5	5.0	16.7	3.3
Total	100	100	100	100.0	100.0	100.0

Source: questionnaire.

Table 4.3 gives an overview of the percentage of the respondents that own or do not own their house or lot. The majority of the respondents claimed to own the house. A large percentage however confirmed that they did not own the lot their house was built on. This confirmed the early assumption that the selected case study areas were in fact primarily squatter areas. The fact that these households were squatters has consequences for the possibilities of these households to obtain access to basic services as for example a piped water supply (see also chapter 3.3.5).

In purok Magnolia all the respondents stated that they did not own the lot their house was standing on. At least 70 percent of the respondents in this purok feared to be evacuated from their land. It should however be noted that there were several respondents that claimed to wait for the papers in which they would become the legal owners of the land. It was stated by several respondents that purok Magnolia would be legalized by way of a governmental loan program initiated by the GSIS²⁶. Even though currently the city government is still the legal owner of the land, the settlers were now at least given the chance to obtain legal ownership of their lots. That is why 30 percent of the respondents stated not to have the fear to be evacuated.

Table 4.3: percentage of respondents that own/do not own house or lot per purok

%	Kapawa (n=20)	Masipag (n=20)	Paraiso (n=20)	Punta Taytay (n=60)	Magnolia (n=30)	Sawmill (n=30)
Own house	80	100	100	93.3	96.7	96.7
Other, rent, legal or illegal squatting	20	0	0	6.7	3.3	3.3
Own lot	35	30	20	28.3	0.0	23.3
Other, rent, legal or illegal squatting	65	70	80	71.7	100.0	76.7
Respondents who fear evacuation	20	60	60	46.7	70.0	50.0

Source: questionnaire

²⁶ Government Service Insurance System

This was also the case in purok Sawmill, where the residents have been given the opportunity to buy the land from the legal owners. Some of the respondents in this purok were able to obtain legal ownership of the land their house was built on. However, most respondents stated that they could not afford to buy the lot and therefore have remained squatters. In the other survey areas in barangay Punta Taytay the land was primarily owned by a wealthy family or a bank. The residents of these areas do not have the possibility to buy the land, unless they were close relatives of the land owners. This was especially the case in purok Kapawa, where thus as a consequence only a small percentage of the respondents did not fear to be evacuated.

Most houses in all the survey areas are not accessible by an improved road. The main roads are often located far from the inaccessible squatter areas. This has several consequences as regards the access to basic services as well (especially in regard to costs – see chapter 3.4.5). In barangay Punta Taytay there is only one improved road running through the barangay. The houses are primarily accessible by unimproved paths in between the trees and houses. In the puroks Magnolia and Sawmill the houses are mainly accessible by eskinita's, small semi-improved and unimproved alleyways of approximately 1 to 1.5 meter wide. Installing water lines in these areas consequently generate engineering problems. The next paragraph will further introduce the available water supplies in the case study areas.

4.3 WATER SUPPLIES IN THE SURVEY AREAS: AVAILABILITY

In four of the five puroks used for a case study there was no official water supply system from the local water utility BACIWA available. This was also the main motive why these areas were chosen as case study areas. In the first part of this paragraph the various reasons why these four puroks are not connected to the water supply system of the BACIWA are examined. This will be followed by reviewing the reason why one of these puroks i.e. purok Magnolia is connected to the BACIWA.

The other parts of this paragraph will first look at the actual water supplies used for drinking water. For the reviewing of these figures are the case study areas split up into, on the one hand the case study areas in Punta Taytay (kapawa, Masipag and Paraiso), on the other hand the case study areas of Sawmill and Magnolia. In the second part of this paragraph all the other sources which are primarily used for all other purposes as for example washing, cleaning and bathing are looked at in more detail. The last part will discuss the functioning of a local water supply system in barangay Punta Taytay.

4.3.1 CONNECTIONS TO THE BACIWA SERVICES

Barangay Punta Taytay. is located at the edge of Bacolod City on the Bago city boundaries, and far from the BACIWA water pumping stations. This geographic location is most probably the main reason why this barangay is not connected to the service system of the BACIWA. The figures obtained from the BACIWA confirm that the households in barangay Punta Taytay do not have a connection to the official water supply system. In the phase III project the BACIWA however does have plans to connect barangay Punta Taytay to the system. At the time of visit the barangay officials confirmed that the BACIWA already placed a main waterline parallel to the main road running through the barangay. Along the highway which leads from the city centre of Bacolod going to the border with Bago, the BACIWA was also active installing main water lines (see figure 4.1).

In Barangay Bata approximately 113 households are actively served by the BACIWA (BACIWA, 2004). However, purok Sawmill in barangay Bata does not have access to the BACIWA system. The BHW's in the purok claim that this is primarily caused by the location of the purok in reference to the main water lines. The main water lines are located parallel to the main road, which is nearly 300 meter from the main entrance of purok Sawmill. The respondents in purok Sawmill stated that they have no connection to this main water line because they have to pay for the extension line from the main line themselves (see box 5.1). Up until now they still have not been able to organize or pay for this extension line.

Purok Magnolia in barangay 7 is the only case study area in this research where the households have the possibility to connect to the BACIWA services. According to the figures from the BACIWA there are approximately 841 active connections in barangay 7 (BACIWA, 2004). The reason for the fact that there are BACIWA water supplies available in this purok is thought to be caused by the many commercial establishments in the barangay. In many cases these commercial establishments have extended their water lines into the barangay. The households then could connect to these extended lines.

Figure 4.1: a) New main water lines constructed near the main road; b) Water meters and water lines at the entrance of purok Magnolia, barangay 7.



The majority of the household connections which are made to the extensions of the water lines for commercial buildings originate from outside the purok. The main lines are thus connected on a point outside the purok. This is also the location where water meters are installed (see figure 4.1). From there-on the water is transported above ground in black flexible plastic pipes reaching up to the houses. These plastic pipes are made for low pressure water supplies; however they are vulnerable and prone for damages when installed above ground. When these pipes are not properly protected they could show leakages which in turn cause high loss of water. These losses are often measured by the water meter, and the household connected to the leaking pipe will thus have to pay for these losses.

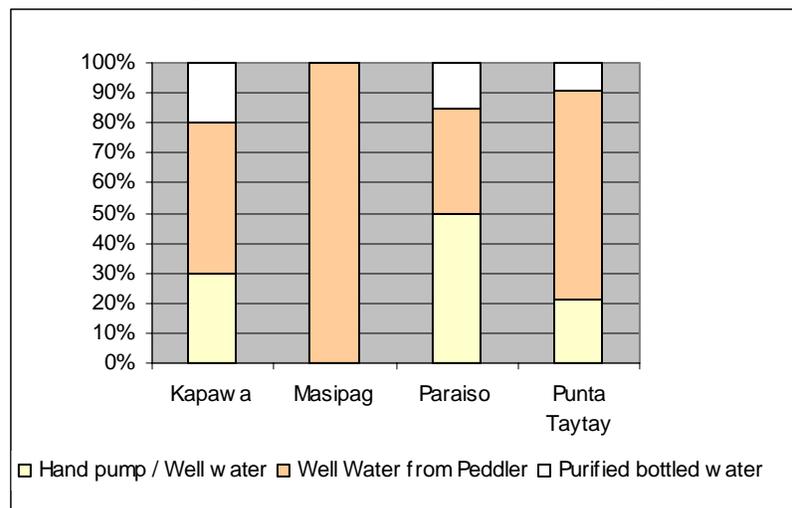
The next part of this paragraph will deal with the available water supplies which are actually used by the households per case study area. In this research the water supplies have been divided into two different categories of uses. The following section will first deal with the drinking water supplies in the case study areas. In the second part will deal with the water supplies used for all other domestic purposes e.g. washing, cleaning, bathing etc. Last part of this paragraph will examine the functioning of a local water supply system in barangay Punta Taytay i.e. the BPWSS.

4.3.2 DRINKING WATER SUPPLIES: KAPAWA, MASIPAG AND PARAISO

As mentioned in the previous chapters, at the time of visit, it was not possible for the households to connect to the BACIWA water supply system in barangay Punta Taytay. The households in this barangay were thus required to use alternative water sources. The barangay officials acknowledged the problems of the residents as regards the lack of a water supply infrastructure. That is why, with financial support of 2,000,000 php appropriated to the barangay council by Senator Ramon Magsaysay Jr., and with technical support of the DPWH, the barangay council have constructed the Punta Taytay Water Service System (BPWSS). More details on this BPWSS can be found in paragraph 4.3.5.

This barangay water service system however did not provide safe and adequate drinking water. For that reason the households in barangay Punta Taytay needed to allocate alternative water sources for their drinking water needs. The households in the selected puroks have been questioned on how they obtained access to potable water.

Figure 4.2; Drinking water supply sources per purok 1 (dry season figures)



Source: the questionnaire

In all the puroks a large number of the respondents stated that they depended on various peddlers who sell them containers²⁷ of well water (see figure 4.2). This well water is their primary source of drinking water. The respondents pay approximately 5 php for one container of water (+/- 20 litres). This is however 10 times the price they would have to pay for the same amount of water from the BACIWA.

The peddlers collect the water from a nearby barangay i.e. Sum-ag, where there are no problems with the salt intrusion. Most of the peddlers buy this water at a house that has a private deep well with electric pump as well as an elevated tank. At these locations the peddlers pay approximately 0.50 php for one container of water. They transport these containers from the collection point in Sum-ag in a trisikad or tricycle too the households that have placed an order. They travel approximately 500 -1000 meters to get the water from the collection point to the households (see figure 4.11).

²⁷ One container contains approximately 5 gallon, or 19 litres of water.

Another alternative that is widely used by household in the selected puroks are the hand pumps. These hand pumps are located near or in the puroks. This in turn, in all cases, does also mean that the water coming form these hand pumps is affected by the saline intrusion. However, most households claim not to be bothered by the salty taste of the water. Thus the hand pumps function as an important source for drinking water as well.

The salty environment of the purok causes many of the hand pumps to corrode. After a lifetime of 2 years, and sometimes only 6 months, the hand pumps are often not properly functioning any more, and need to be replaced. This highly influences the quality of the water as well. The water from the hand pumps often contains brown particles that come from the oxidation process. From time to time a hand pump breaks down. In case an important public pump breaks down the community collects money to repair the pump themselves.

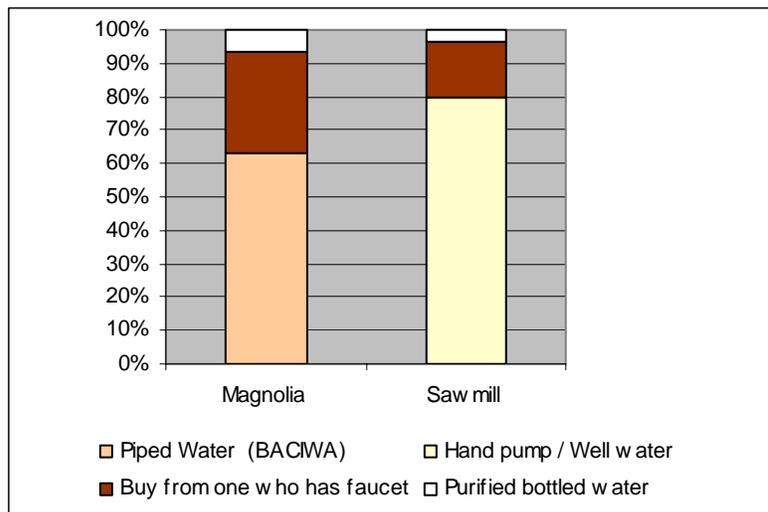
On the whole there are approximately 81 private and public hand pumps in barangay Punta Taytay. In purok Kapawa, Masipag and Paraiso there are respectively 8, 6 and 10 hand pumps available. Although not every household has access to these hand pumps, as several of these are private. When a household has sufficient financial capabilities, they could also buy purified water from refilling stations of which one is present in the barangay and one is located near the main road on the way to the barangay from the city centre.

4.3.3 DRINKING WATER SUPPLIES: MAGNOLIA AND SAWMILL

There are vast differences in the available water supplies in purok Magnolia and purok Sawmill. Purok Magnolia is the only survey area that has access to the BACIWA water system. Numerous household in this purok make use of the services of the BACIWA. A little more then 60 percent of the respondents in purok Magnolia have their own faucet with BACIWA water, which is their primary source of drinking water (see figure 4.3). Other respondents use water from the BACIWA as well. They buy this water from a house nearby that has a connection to the BACIWA. These household often cannot afford, or maintain a connection to the BACIWA themselves (these have been disconnected). When the respondent could afford it, they would primarily buy purified mineral water at a refilling station as their primary source for drinking water.

In purok Sawmill there are many hand pumps scattered across the purok. According to the residents and the BHW's there are approximately 34 public hand pumps available in Sawmill. Approximately 80 percent of the respondents utilize these hand pumps as their primary source of drinking water supply. There are only a few households that use well-water from a private deep well which can be operated with an electric or a hand pump.

Figure 4.3: Drinking water supply sources per purok 2 (dry season figures)



Source: the questionnaire

The other 20 percent of the respondents often buy purified water or buy water from a household that has their own faucet. This is not water from the BACIWA, but water that comes from private deep wells with electric pumps. The water from these wells is often not treated and stored in elevated tanks. One house, located just outside purok Sawmill, commercially sells water from a private deep well. This house is located near a sari-sari store. There is a schedule of buying water from 7-11 am and 2-6 pm.

The differences of water supplies in between these two cases are predominantly caused by the access to the BACIWA service system. An additional reason is also the fact that there are not many alternative water sources available in purok Magnolia. There are approximately 6 hand pumps present in the purok, however only 3 of these hand pumps are still actively used. Water dug wells are also scarce. There are only 4 dug wells available in the purok. In all other case study areas there were many hand pumps and dug wells available. However, these sources often cannot be used for direct consumption. The following paragraph will discuss these alternative sources not used as drinking water supplies.

4.3.4 WATER SUPPLIES FOR ALL OTHER PURPOSES

In all survey areas the respondents primarily made use off a broad range of sources for many different purposes. The above paragraphs have discussed the various sources utilized for direct consumption. Here the various sources used for all other domestic purposes will be discussed e.g. washing, bathing, cleaning, water for livestock (if present) etc.

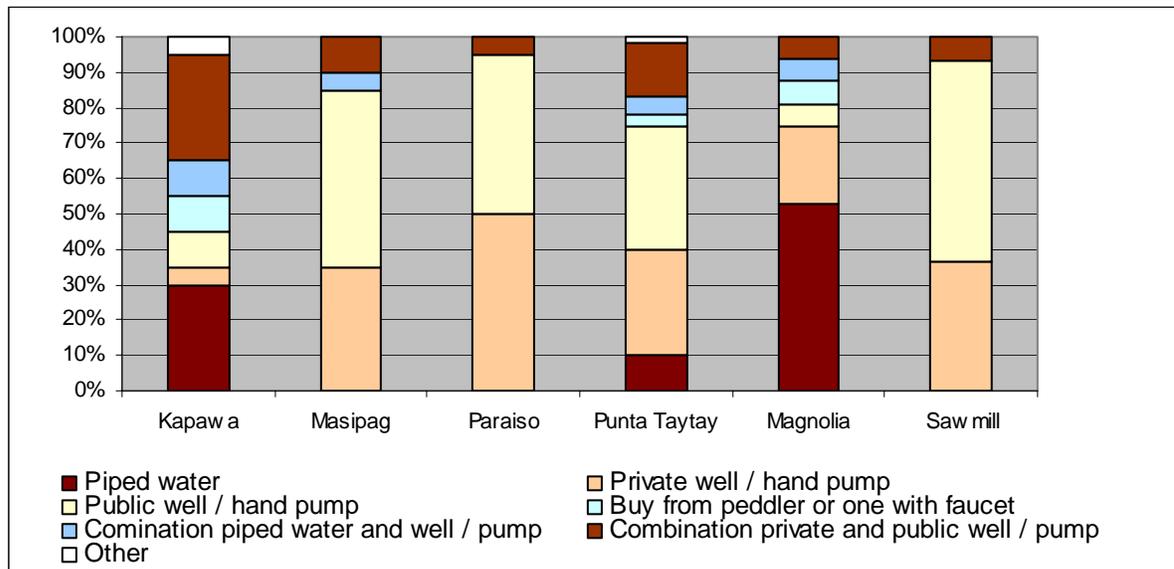
In many cases the respondents used more than just one source for various purposes. In this research the various sources are divided into 6 categories. These categories are for the most part extracted from the categorization made by the National Statistics Office (NSO). The division of sources is based on the quality of the water that can be extracted as well as the accessibility of the source by the household unit. This led to the formulation of the following categories:

- Piped water connection (faucet from BACIWA or BPWSS);
- Private piped water sources/ well water;
- Public hand pump or open dug wells;
- Private hand pump or open dug well;
- Buy from peddler or from house with faucet;
- Purified mineral water and;
- Others (i.e. rain water, river etc.)

In the survey areas of Kapawa, Masipag, Paraiso and Magnolia more than 70 percent of the households utilize 2 or 3 different sources for their water supplies. Only in purok Sawmill approximately 57 percent of the respondents claimed to utilize merely one water source. The main reason that in purok Sawmill merely one water source if utilized can be assigned to the fact that there are not many other sources available in this purok.

The main sources available in purok Sawmill are the many hand pumps. Alternative sources i.e. public or private dug well are available, but these are in many cases not utilized. The open dug wells are often not used because of the water quality and the effort people need to put in extracting the water from these wells. This is also the reason why many respondents would like to have piped water supplies. The piped water supply is an easy accessible source and provides water with a better quality (see paragraph 4.5.2). However, the hand pump remains the main source of water supply for all other domestic purposes.

Figure 4.4: Water sources used for d purposes other then drinking water per purok (dry season figures).



Source: the questionnaire

In Magnolia the respondents primarily use the water from the BACIWA for all purposes. In this purok there are only a few available public and private wells with hand pump. These hand pumps are still optimally used for the all other purposes. The water from these sources is appealing for the respondents because they do not have to pay for its use. In many cases however the BACIWA water is also used for all other purposes. If households do not have a private connection to the BACIWA they can always buy water from a household nearby that does have a private connection. They often have to pay 5-10 times the price that they would have to pay for the BACIWA water if they would have a private faucet.

Similar to the situation in purok Sawmill, the respondents in purok Masipag and Paraiso mainly dependent on public or private wells with or without a hand pump. In these puroks the household mainly depended on peddlers for their drinking water supplies. The water bought from these peddlers is in many cases not used for any other purposes. A reason for this could be the fact that the water from most of the other sources e.g. the hand pumps is free of charge, while the water obtained from the peddlers is not. Several respondents in purok Masipag have their own piped water supply system installed and there was one respondent that had a connection to the barangay service system (BPWSS). Whereas these sources do not provide adequate water that could be used for drinking, the water can still be used for the all other purposes.

In purok Kapawa a larger percentage of the respondents have a connection to the BPWSS. This corresponds with the total number of households that, according to the barangay council's records, are connected to the BPWSS. In Kapawa there are 20 households connected to the system, while in Masipag only 7 households and in Paraiso there are no households connected to the BPWSS. There are only few households that have their own piped water system. In the areas where there are households with a faucet from the BPWSS, there are several household in the vicinity that also utilize these faucets. This is also the case for several households in purok Kapawa. In the last part of this paragraph the Barangay Punta Taytay Water Service System will be further elaborated.

Figure 4.5: a) Purified water delivery; b) Children washing and bathing near the public dug well.



4.3.5 THE BARANGAY PUNTA TAYTAY WATER SERVICE SYSTEM (BPWSS)

As mentioned in a previous part of this paragraph, there have been some efforts to build a water supply system in barangay Punta Taytay. The project to construct a water system in barangay Punta Taytay started with the implementation of a feasibility study. This study was carried out by the DPWH and concluded that there were no potable water supplies available in barangay Punta Taytay. The main problem with the water resources in the barangay is the saline intrusion. Almost all water sources are damaged by the saline intrusion.

The first plan developed by the DPWH was to extract water from outside the barangay and actually provide potable water to the households in barangay Punta Taytay. If they wanted to provide potable water, they would have to extract water from outside the barangay. This project however would be very expensive. Eventually it turned out that there was no sufficient funding to implement the first plan drawn up by the DPWH. Therefore the barangay council developed a new plan. The reason the barangay council claimed to have for the development of a new plan was that they wanted to provide water to the households as soon as possible. In November 2002 the barangay implemented the second plan with the technical support provided by the DPWH, CE and an engineer from the BACIWA. In this plan the water system was supposed to extract water from 7 deep wells (of which only 5 are now functional) located within the barangay.

Before the implementation of this project the barangay council knew that the water from the wells would not be potable. However, they did proceed with the project. In April 2003 the BPWSS was able to provide the first households with water from the new system. At that time the system only served 57 households. Presently the system supplies water to approximately 167 households within the barangay (May, 2004). These households have to pay a minimum of 100 php each month for the use of 10 cu/m. Every additional cu/m used will cost 10 php. The main problem of the BPWSS is that they can not provide potable water. The water used for the service system is extracted from wells located in the barangay. And, as previously mentioned, the water from these wells has been affected by the saline intrusion. Another problem of the BPWSS is the management i.e. the lack of knowledge on how to manage a water system. Many people complain about their water bills, and the functioning of the water meters²⁸. People don't pay their bills, and therefore the barangay can't pay the continuously rising electric bill.

²⁸ There are 3 different sorts of water meters installed, and there have been some troubles with reading of the meters.

If a household wishes to connect to the water system, they have to pay 2,300 php connection fees. This is divided into 2,000 php for the materials, 100 php for the paper work and 200 for the installation/connection to the water system. This includes the instalment, the water meter and 10 meters of pipelines. Additional costs are for the household that is to be connected. To make the first connection to the barangay system affordable for every household, the barangay council has created an alternative payment method. This method is structured by a first payment, which will be 800 php for the connection. The other three payments of each 500 php need to be made by the first three months of billing.

However, many squatters still have problems with connecting to the water system. The owners of the land do not allow the barangay to connect these households. The barangay council has encountered some problems passing private property with the pipes to reach the puroks more inland as well. The owners do not allow the barangay to lay the pipes. This could also be a problem for the households that would like to connect to the BACIWA services in a near future.

There are many problems with the implementation of various rules and regulations of the BPWSS. For instance, presently there are only 56 of the 167 connections that have fully paid the installation costs (May, 2004). The barangay officials acknowledge the problems they have with the management of the water service system. That is why they are proposing to create a cooperative. The main idea is that the cooperative will take control of the complete water system. The water system will be granted to the cooperative. The cooperative should be self sustaining and manage a functioning water service system. In case of mismanagement of the cooperative, the barangay will take over again.

In addition to the previous stated problems, there is another problem as regards the relationship between the BPWSS and the BACIWA. The barangay has constructed a water system that does not provide potable water. Now the BACIWA wants to provide water services in the barangay after the completion of the phase III project. However, the question remains if these two systems will be able to exist next to each other, or if they will join forces in providing the households in barangay Punta Taytay with potable water.

According to the BACIWA the barangay officials have three options:

1. The BACIWA will provide one connection for the entire barangay. The barangay would then be responsible for distribution and connecting the households. In this case the barangay will need to pay the bulk rate for water, which is three times higher than the residential rate.
2. Another option is that the barangay makes a turnover to the BACIWA. In this case the barangay would pay the BACIWA for the turnover. This does also happen in cases of turnovers from subdivision water supply systems.
3. The last option would be that the BACIWA and the barangay would function next to each other. The barangay system would provide the water for washing and bathing, and the BACIWA would provide the water for drinking.

The barangay officials however would like to turnover the system to the BACIWA, but they want the BACIWA to pay them the 2 million php they have invested in the water system. The BACIWA have declared that under no circumstances they will pay for a turnover. In particular in the case of barangay Punta Taytay, where the operational wells can and will not be used for providing potable water, payments are not advisable. In addition, the BACIWA claimed that they already have pipes installed along the main road of the barangay.

In line with option three the two water supply systems will probably function next to each other. This would mean that the households already connected to the BPWSS would have to pay another fee for the connection to the BACIWA. Some of these household already have indicated that they could not afford to pay for this additional connection fee. These problems will need to be resolved at the barangay level. However, the salt intrusion remains the main problem in the lack of potable water in barangay Punta Taytay i.e. the cases of purok Kapawa, Masipag and Paraiso.

The BPWSS only supplies water that can be used for all other purposes besides drinking or direct consumption. Therefore this system did not solve the main problem of the barangay as regards the lack of a sufficient safe supply of drinking water. However, the households that currently make use of the BPWSS do have the advantage of using the services for their daily supply of water used for all other purposes. The BPWSS services represent an easy accessible water supply. The system is accordingly an improvement for many households in barangay Punta Taytay. In the next paragraph the elements of accessibility and use of water supplies is examined in more detail.

4.4 ACCESS AND USE OF WATER SUPPLY

In all the case study areas there is a high variety of sources utilized for domestic purposes. Only in the case of purok Magnolia the households have access to a potable piped water supply from the BACIWA. In the other cases i.e. purok Kapawa, Masipag, Paraiso and Sawmill the respondents are forced to utilize alternative and unimproved water sources. The question remains if these sources are adequate to secure a sufficient safe water supply to every household.

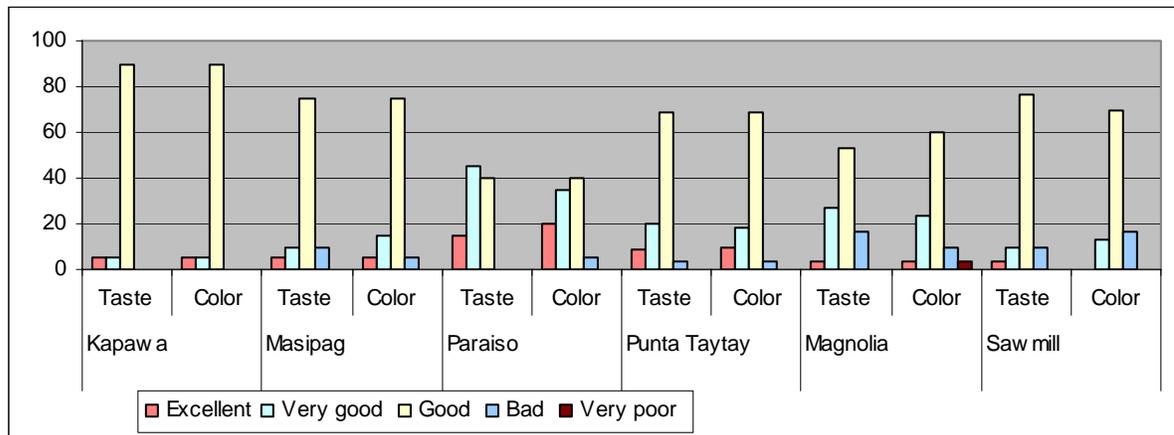
According to the National Statistics Office, an adequate water supply constitutes an own-use faucet, a shared faucet, an own-use tubed/piped well as well as a shared tubed/piped well (NSO, 2004). This would mean that in line with the official Philippines standard, nearly all respondents in all the case study areas have access to adequate water supplies. The NSO argues that these sources represent a clean and safe supply of water. This Philippine standard of adequate water supply is however one of the many standards as regards access to sufficient safe water supplies. These standards do not always secure a household's access to an adequate safe water supply at all times. There are several other key issues that influence the access to safe water supplies.

In this research the households in the various case studies have been asked their opinion on their access to, as well as the quality and safety of their drinking water supplies. The quality of the sources used for all other purposes have been of a lesser priority. This does not necessarily mean that the quality of these sources actually is less important. The focus of this part of the research is however mainly on the drinking water supply. In addition, the respondents have been asked on their behaviour in regard to the use of water. Other than the quality of the water, the quantity as well as the proper use of water supply is examined. The next part will start with reviewing the perceived quality of the drinking water.

4.4.1 PERCEIVED QUALITY OF DRINKING WATER

To explore the subject of water safety the interviewees were first questioned to give their perceived quality of the drinking water supply. Good quality and safe water should be odourless, without unpleasant tastes as well as clear and colourless. The question was therefore divided into the taste of the water and the colour of the water. The respondents were asked to evaluate the taste and colour as divided into five categories. This was supposed to help the respondent to make an easy assessment of the water quality.

Figure 4.6: Percentage of respondents and their perceived quality of drinking water sources per purok.



Source: the questionnaire

Many respondents however clearly had some difficulty with rating the taste and colour as they never really thought about these aspects of their water supply. This is also reflected in the results of this question. These results show that many people in all case study areas rated the taste and colour predominantly very good and good (see figure 4.6). Only a few respondents stated that the water had a bad or very poor taste or colour.

According to the City Health Office (CHO) and the BHW's who check the quality of the various sources, there are no real problems with the quality of the water sources in Bacolod City (see chapter 3.5.2). However, the respondents in the case study areas for the most part did state to fear falling ill from their current water supplies (see table 4.4). This would mean that there are doubts on the quality of their water supply. Why the respondents actually did have doubts on the quality of their water supply has not become clear to the researcher. A possible reason for the people's fear as regards the quality of the water could be the fact that there are no adequate waste water disposal facilities. The water used by the household is often disposed off near the house or at the water source (washing and cleaning is often carried out near the hand pump). This highly influences the quality of the water.

A remarkable result is that 80% of the respondents in purok Magnolia, where the BACIWA is the main water supply, feared to be falling ill from water. In all other survey areas, where there is no BACIWA water used, only an estimated 50 percent of the respondents feared to become ill from consuming water. The main reason for this difference can be assigned to the high expectations and knowledge of the respondents in regard to the quality of the water from the BACIWA. The water from the BACIWA is however not always of such a good quality either. According to the respondents, especially at times of low pressure, and after a brownout, the quality of the water coming from the faucet is not so good. The water is then has a yellow colour and has a bad smell (see also 4.4.2).

Even though many of the respondents have stated to fear falling ill from their current water supply, they do not feel the need to take precautions to ensure the quality of the water (by for example heating or filtering the water before consumption). Only in purok Kapawa more than 60 percent of the respondents claimed they did take precautions to ensure the safety of their water. This is not reflected in the percentage of persons in the household that has suffered from diseases caused by drinking water in this purok (see table 4.4). In many cases the respondents stated that they trust the barangay officials and the BHW's to ensure the safety of their water supply, and therefore do not have to take precautions to ensure the quality of the water. The next part will deal with the more proper consumption methods.

Table 4.4: Securing water quality per purok.

	Kapawa (n=20)	Masipag (n=20)	Paraiso (n=20)	Punta Taytay (n=60)	Magnolia (n=30)	Sawmill (n=30)
% respondents that fear falling ill from water supply	45	50	80	58.3	80.0	53.3
% that takes precautions with safety of water	60	10	25	31.6	36.7	36.7
% persons in household that suffered from diseases caused by drinking water	40	30	50	40.0	40.0	13.3

Source: the questionnaire

4.4.2 PROPER CONSUMPTION AND USE OF WATER SUPPLY

Not only providing sufficient safe water, but also encouraging appropriate consumption and ensuring appropriate disposal after use are important elements in securing an adequate safe water supply. The CHO stated that the major water related diseases in Bacolod City are typhoid fever, diarrhoea, hepatitis A, Amoeba and various parasites. The first two diseases i.e. typhoid and diarrhoea are easy to prevent by improving the water quality and prevent casual use of unimproved sources (UNICEF, 1999). The most common water related diseases mentioned by the respondents in the survey areas are diarrhoea and amoeba. Other diseases given were often not water related (see appendix 4).

If there are doubts about the quality of the water, there are some possible measurements that can be taken. In the first place the water can be chlorinated. This is an effective method for short term purification. Secondly the water can be boiled. However, boiling is not a sustainable method because of the high expenses for fuel. Thirdly the water could be filtered. There are various methods to filter water successfully. Though, preventing the water from bacteriological infection is of course the most effective method to ensure the quality and safety of the water.

Table 4.5: Safety measurements of various water sources per purok.

	Kapawa		Masipag		Paraiso		Punta Taytay		Magnolia		Sawmill	
	n	%	n	%	n	%	n	%	n	%	n	%
Heating / boiling	9	45	2	10	2	10	13	21.7	4	13.3	6	20.0
Filtering	2	10	0	0	3	15	5	8.3	6	20.0	5	16.7
Heating / boiling and filtering	1	5	0	0	0	0	1	1.7	10	0.0	0	0.0
No safety measures	8	40	18	90	15	75	19	68.3	20	66.7	19	63.3

Source: the questionnaire

Only few households in purok Masipag, Paraiso, Magnolia and Sawmill actually make use of a method to ensure the safety of their water used for direct consumption. In purok Kapawa 45 percent of the respondents boil the water before consumption. In Masipag and Paraiso respectively 90 and 75 percent do not use safety measures. In purok Magnolia approximately 22 percent of the respondents boil the water before consumption, and 68 percent do not use safety measurements at all. This high percentage of respondents that do not use safety measurements in this purok could be caused by the many household that are connected to the BACIWA water system. The water from the BACIWA is already treated, and the respondents do not see the use of treathing the water a second time. However, several respondents stated to filter the water from the BACIWA after a brownout. After a brownout there is often a lot of residue in the water coming from the faucet.

In purok Sawmill around 63 percent of the respondents do not take safety measurements. Only 20 percent of the respondents sometimes boil the water, and 17 percent filter the water. In some cases the water is already filtered at the pump. The filters are attached to the mouth of the pump (see figure 4.7).

Figure 4.7: Hand pumps in purok Sawmill with different sorts of filters attached to the pump.



A very important element in the use of a water supply is preventing unnecessary wasting of water. The squandering of water can lead to severe shortage in times of scarcity and stress in water availability. The respondents have been asked if they ever experienced any shortages of water use. Already at the beginning of the survey it became clear all the respondents had problems with answering this question. This was partly caused by inexperience of the researcher. The collected answers therefore have been considered not reliable. That is why this topic will further not be used in this review.

As regards the usage of water supplies the respondents were also asked if they were using water saving measurements. These saving measurements could make the difference of a little water supply or no water supply at all during times of extreme droughts. According to the respondents, there are droughts and shortages of water predominantly during the dry season²⁹. The majority of the respondents however claimed never to use any saving measurements.

In the cases of Kapawa, Masipag and Sawmill more than 50 percent of the respondents never did practice any saving measurements. In purok Magnolia however more than 83 percent of the respondents did practice saving measurements. This may be caused by the information given to users of a BACIWA connection, on various methods of saving water (see figure 4.8). Even though in purok Paraiso there are no BACIWA services, many of the respondents also made use of various saving measurements. Informing the people on how to conserve water is not only the responsibility of the local water utility. The local government units i.e. the barangay council is also responsible for informing the people on how to practice saving measurements. This task is mainly carried out by the BHW, who also inform the households on the safety and safe use of the water supplies.

²⁹ Dry season is primarily in the month April and May.

Table 4.6: Practicing saving measurements and source of information per purok.

	Kapawa (n=20)		Masipag (n=20)		Paraiso (n=20)		All (n=60)		Magnolia (n=30)		Sawmill (n=30)	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Practice saving measurements	50	50	25	75	60	40	41.7	58.3	83.3	16.7	30.0	70.0
Heard something on or received any information on conserving water	30	70	40	60	50	50	43.3	56.7	86.7	13.3	56.7	43.3

Source: the questionnaire

Before questioning the interviewees on the practising of saving measurements, they were asked if they ever heard something, or received any information on conserving water. In most cases the respondents did see some advertisements, or received information on conserving water. Only in purok Kapawa and Masipag the majority of the respondents never received any information on conserving water.

After the questionnaire was completed in barangay Punta Taytay, there was a new question added to the questionnaire. This question was only asked in the puroks Magnolia and Sawmill. The respondents were asked if they ever received any information on practicing saving measurements, and where or by what medium they did take notice of this information. Most respondents stated that they heard something in regard to conserving water on the radio or television. Another important source of information was the BACIWA (even in Sawmill, where there are no BACIWA services). Only few respondents heard this information from the barangay (see appendix 4). Later the BACIWA notified the researcher that they also made radio commercials on the conservation of water.

Figure 4.8: a) Washing clothes at the hand pump; b) Water saving tips handout from the BACIWA.



Source: a) the author, b) the BACIWA, 2004

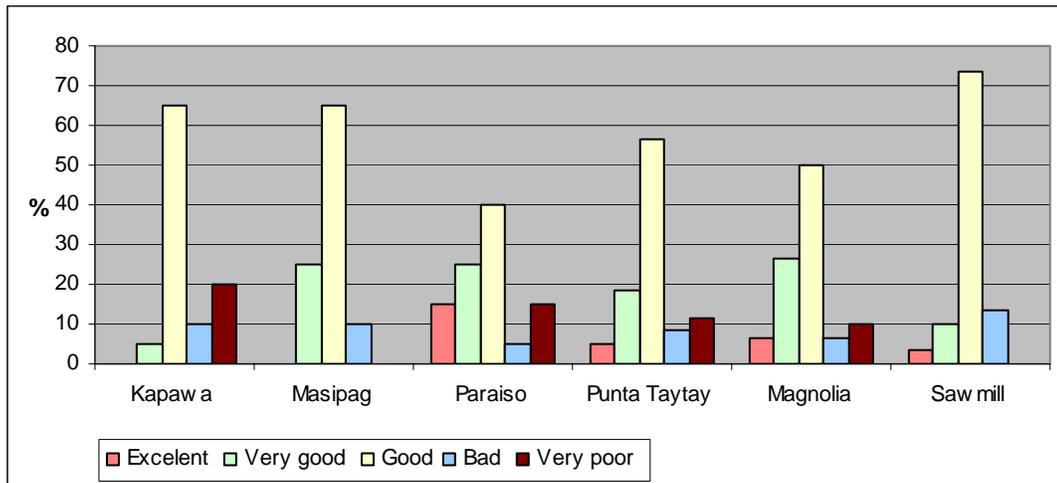
For the next part of this chapter it needs to be noted that eventually several question of the questionnaire are not used in the analysis. These questions were focussed upon the access to a water supply i.e. the distance to the source, the time collecting water and which household members had to fetch the water. In almost all cases these questions turned out to be irrelevant. As regards the distance to the source, many household claimed to have the source within or near the house (within 1-5 meters). This however was often not the source used for direct consumption. In addition to this, many respondents stated that they often wash and clean at the location of the source. This was also observed by the researcher (see figure 4.8). For these reasons, in combination with the inexperience of the researcher, the questions have not been further drawn up in the examination.

The elements of collecting water and the time needed to collect water however did play a role in the reasoning behind the willingness to pay for an improved water source. The next paragraph will introduce the willingness to pay for improved water supplies as well as the ability of the households to obtain access to these improved water supplies will be reviewed. The last part of this paragraph will first deal with the perceptions of the households on their current water supply.

4.4.3 SATISFACTION WITH CURRENT WATER SUPPLY

One of goals in this research was to find out if there were any problems in regard to the access to a sufficient safe water supply as perceived by the households. The respondents were first asked to think about their water supply in general. They were then asked to rate the quality of their water supply into five categories from excellent to very poor. The answers to this question in all cases were very divers. The majority of the respondents rated their water supply as good. In purok Kapawa only 30 percent of the respondents rated their water supply as bad or very poor. In Masipag, Paraiso and Magnolia the water supply was often rated as very good. However, in Paraiso the water supply was also often rated as very poor.

Figure 4.9: Rating the quality of the water supply per purok.



Source: the questionnaire

In the puroks Magnolia and Sawmill there was also an extra question added at the end of the interview. The respondents were asked if they were satisfied with their current water supplies. This question could be answered with a simple yes or no. As the previous results already showed, the majority of the respondents did state that they are satisfied with their current water supply. This was also the case here. More than 75 percent of the respondents in both Magnolia and Sawmill are very much satisfied with their current water supply.

Even though the majority of the respondents in all case study areas stated that they are satisfied with their current water supply, they still believe that there are some improvements needed. Around 75 percent of the respondents in for example purok Kapawa stated that an improvement of the water quality is required. In purok Masipag the majority of the respondents would like to have an improved source³⁰ as well as better quality water. Improvement of the source would also be wishful for 30 percent of the respondents in purok Paraiso. However, an even large group of respondents did not need any improvement of their water supply at all (see all figures in appendix 4).

The majority of the people in purok Magnolia think that there are some improvements needed as regards the quality of their water supply. However, nearly 47 percent of the respondents do not need any improvements at all. An additional 20 percent of the respondents in this purok would like some improvement. They predominantly see a connection to the BACIWA as an improvement. This means that from the 10 respondents in this purok that do not have a private faucet from the BACIWA yet, at least 6 of them would like to have their own faucet. Many of them already buy BACIWA water from a house that already has a faucet.

In purok Sawmill 40 percent of the respondents also would like to have a connection to the BACIWA. The remainder of the respondents in Sawmill would like to see an improvement in the water quality or have an improved source. Only 20 percent of the respondents in purok Sawmill state that there are no improvements needed. In many cases an improvement of water supplies for the respondents in this survey area was also a connection to the BACIWA. The majority of all the respondents have stated that they would like to have a connection to the BACIWA services. Therefore they have been questioned on their willingness and ability to pay for the piped water supplies from the BACIWA. The following paragraph will further examine the willingness and ability of the households to pay for piped water supplies.

4.5 WILLINGNESS AND ABILITY TO PAY FOR IMPROVED WATER SUPPLIES

It has been determined in the previous paragraphs that the majority of the respondents are very satisfied with their current water supplies. Many of these water supplies can be utilized free of charge and provide sufficient water with an acceptable quality for the households in the case study areas. There is a large group of respondents however, that despite their satisfaction with their current water supply would still like to have an improved water supply. In many cases an improved water supply is seen as a piped water supply preferably from the BACIWA. All the respondents have been asked if they would like to have access to the BACIWA services and if they could indicate if they think they could afford to obtain access to these services.

This paragraph will review the respondents' willingness and ability to pay for these improved water supplies. The first part of the paragraph will explore the households' willingness, and the ability to pay for piped water supplies from the BACIWA in the case study areas within barangay Punta Taytay. In this barangay there is also another piped water supply system available. The interviewees therefore have been asked their preferences in reference to the BACIWA or the local water supply system i.e. the BPWSS. In the second part of this paragraph the willingness to pay for piped water supplies in purok Sawmill is examined. The last part of this paragraph will look at the functioning of the BACIWA services in the purok Magnolia.

³⁰ Improved source was explained as a piped water supply or potable water source in or near the house.

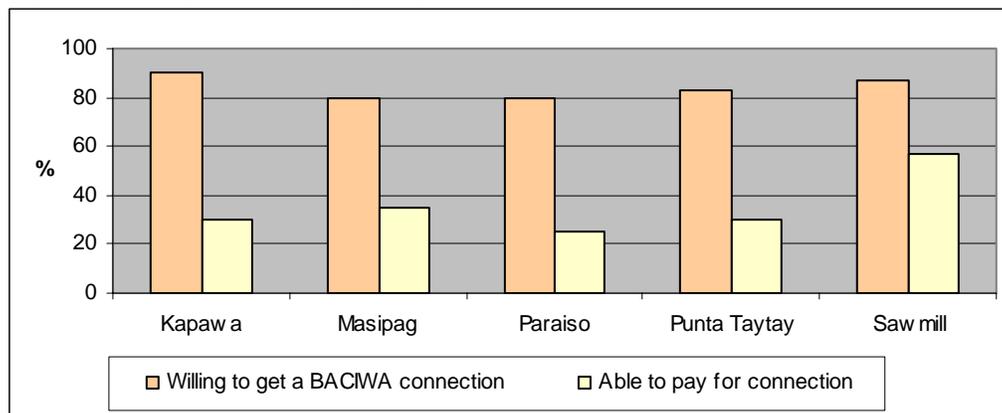
4.5.1 WILLINGNESS TO PAY FOR PIPED WATER: KAPAWA, MASIPAG AND PARAISO

In the case study areas in Punta Taytay the households have no direct access to adequate safe water sources which can be used for consumption in the purok. They have to buy water from peddlers, or make use of the low quality water sources that are available in the barangay. To solve this problem the barangay has created a water supply system i.e. the BPWSS. However, this water supply system does not provide water that can be used for direct consumption. In the phase III project the BACIWA is planning to connect barangay Punta Taytay to their water system. The residents of this barangay can then also connect to the BACIWA service system. That is why the residents have been asked the question if they would like to have a connection to a piped water system, and which of these two systems they would prefer. Additionally the respondents were asked if they thought they could afford to pay for this connection.

The majority of the respondents in purok Kapawa already have a connection to the BPWSS. Many others would like to have a connection to this system. Most of these people are able to pay for a connection to the BPWSS. Another 90 percent of the respondents stated that they would like to have a connection to the BACIWA. An estimated 95 percent of the respondents prefer to have a connection to the BACIWA. The main problem is that a lot of the respondents do not think they can afford to pay for the connection to the BACIWA. The only household that did not preferred a connection to the BACIWA already had a connection to the BPWSS, and did not want to pay for an additional connection to the BACIWA.

Of the respondents in purok Masipag approximately 55 percent would like to have a connection to the BPWSS, and 80 percent would like to have a connection to the BACIWA. As in purok Kapawa most respondents do not think or do not know if they can afford to pay for the connection to the BACIWA. A smaller percentage of the respondents have stated the same for the BPWSS. This is mainly caused by the fact that many respondents do not know how much they have to pay for the installation and use of water from the BPWSS and BACIWA. In addition are in some cases the household income very inconsistent (no fixed income), and thus it is not easy to indicate if they could afford it in the future.

Figure 4.10: Willingness to and ability to pay for connection to the BACIWA per purok.



Source: the questionnaire

The last area that is visited for the survey in barangay Punta Taytay did not have any households that were connected to the BPWSS. However, there are several respondents that would have liked to have a connection to the BPWSS. In purok Paraiso around 65 percent claimed that they do not want a connection to the BPWSS but 80 percent did want to have a connection to the BACIWA. At least 90 percent of the respondents preferred a connection to the BACIWA over a connection to the BPWSS.

In all survey areas in Punta Taytay the majority of the respondents preferred a connection to the BACIWA instead of a connection to the BPWSS. The main reason for this is that they assume that the water from the BACIWA has a better quality and is drinkable. Though, some respondents preferred the BPWSS because they don't think they are able afford the connection to the BACIWA. The main reason for most of the respondents in all the above stated case study areas to obtain access to a piped water connection is because of the time and effort it will safe in collecting the daily water requirements (see also appendix 4).

There are no potable water sources available in the case study areas in barangay Punta Taytay. The households in these areas depend mainly on the peddlers who sell them potable water which is collected at the nearby barangay Sum-ag (see figure 4.11). Presently the main problem is that the prices of containers with potable water that they buy from these peddlers have been increasing and the quality of the water from the hand pumps is decreasing. Especially during the dry season³¹, when the water table of the wells are low, the quality of the water is questionable.

Figure 4.11: a) Peddler at water filling station in Sum-ag; b) Washing clothes near the hand pump and the public dug well (see drum in the background)



There are however several problems related to the eventual connection to the BACIWA service system. For instance, the BACIWA had planned a meeting in the barangay hall of barangay Punta Taytay. This meeting was called upon to inform the people on the costs and requirements for a connection to the BACIWA water system. Due to a miscommunication between the barangay officials and the BACIWA representatives, nobody turned up at the meeting. That is why many people in the barangay still do not know what the costs and requirements are to connect to the BACIWA.

In addition to the lack of knowledge on how to connect to the BACIWA services approximately 60 percent of the respondents only have a monthly household income that is under the 5,000 php a month. With a household income under the 5,000 php a month it would be very difficult to accumulate enough money to pay for the 3,000 php that needs to be paid for only the standard connection costs. When there are additional costs, the household have to pay for these themselves. Especially the households who are far from the main lines would have to pay a high connection fee. An option given by the BACIWA for the squatters that can not afford to pay for an individual connection would be a communal connection (see paragraph 3.4.5)

³¹ Dry season is primarily in the months April and May.

Another main problem is that many residents in the barangay are squatters. The requirements for squatters to connect to the BACIWA are often difficult to fulfil. The squatters often live in the marginal areas of the purok (flood prone areas) and far from the main road. If they would like a connection to the BACIWA, there would be high additional costs for the actual connect to the main lines near the main road. Even the BPWSS has encountered problems with connecting several squatters to their water system because the owners of the land did not allow them to. In purok Masipag the owner of the land did not even allow the barangay to install a public hand pump.

4.5.2 WILLINGNESS TO PAY FOR PIPED WATER: PUROK SAWMILL

In barangay Bata there are already several main water lines from the BACIWA present. However, these lines only run parallel to the main. This main road is far from purok Sawmill. In the purok there are no water supplies of the BACIWA or a barangay service system. The main water source utilized for direct consumption as well as other domestic purposes in purok Sawmill are the commonly available hand pumps and dug wells. According to the respondents in this purok are these hand pumps an adequate safe water supply for their daily needs. The water from the hand pumps does not cost them anything. The only costs attached to the use of hand pumps are the recurring maintenance costs. The respondents stated that the pumps break down regularly. If there are repairs necessary, there is always someone who will visit the households that have been utilizing the pump to collect 5-10 php. With that money they can then repair the pump.

The costs for the use of the public hand pumps are low, and the quality as well as the quantity of the water is to the respondent's satisfaction. The majority of the household are therefore satisfied with these alternative water supplies. However, there are sometimes doubts on the quality of the water. After flood or rains the water is of a lesser quality. At these times the water is kind of yellow. This is most likely caused by the iron particles in the ground and in the pump. However, this is not a real problem for the residents of purok Sawmill. Many respondents also stated that they do not have any alternatives and therefore are satisfied with what they have been given.

The respondents in purok Sawmill were also asked the question if they think that there are any improvements needed. At least 40 percent of the respondents would like to have a connection to the BACIWA (see figure 4.10). At the end of the questionnaire all respondents have been asked the question if they were willing to pay for a connection to the BACIWA. Approximately 87 percent of all respondents have stated to be willing to pay for a connection to the BACIWA. However, only 57 percent of the respondents thought they could afford a connection. As in the other survey areas, many households here do not have a fixed income. This was the main reason that 33 percent of the respondents did not know for sure if they could afford a connection. Many respondents didn't even know how much they needed to pay for the connection, but they assumed it would be too much. The water quality was one of the main reasons for most respondents that would like to have a connection to the BACIWA. There were several other reasons, of which the comfort and time saved where again were very important aspects (see appendix 4).

4.5.3 FUNCTIONING AND AFFORDABILITY OF BACIWA IN PUROK MAGNOLIA

Although the BACIWA services are available, not all residents in purok Magnolia make use of the BACIWA services. In this research purok Magnolia was the only survey area where at the time BACIWA services were available. That is why the respondents that had a connection to the BACIWA were questioned on these services. From a total of 30 respondents approximately 67 percent stated they already had a private faucet.

An additional 20 percent of the households in purok Magnolia would like to have their personal private faucet. Most of the respondents that do not have their own faucet already make use of BACIWA water. They buy the water from a house nearby that has a private connection. They pay approximately 2-5 php for one container of water.

It was suggested that in the squatter areas there are many cases in which one official connection to the BACIWA would be shared by several households. This was also the case in Magnolia, where 7 out of the 20 respondents that had a connection to the BACIWA shared this connection with another household. The household that share a connection with another have illegally extended the lines to the other houses where a new faucet is installed. The BACIWA has stated that connecting several household to one official connection is illegal, but these practices are often very difficult to prevent.

Only 3 out of the 20 respondents that have a connection stated that they had difficulty attaining the initial connection. One respondent had difficulty with the price that she needed pay for the connection, and the other two did not have the right papers in regard to the title of the land. This requirement was only established by the BACIWA since 1998. Most households that already have a connection to the BACIWA often have been connected for many years already. Some respondents could not even remember when they got the initial connection, because it was such a long time ago. Others only recently have been connected, or reconnected.

Approximately 65 percent of all the respondents have a higher water bill in the months March, April, May and June. These are the months of and around the dry season. Only one respondent had a higher water bill in November, because they had a leakage in that month. A majority of 70 percent of all the respondents that did have a connection to the BACIWA think that the current water rate is too high. Only 30 percent thinks it is a normal rate, and there was no respondent that thought the water rate was to low. At least 90 percent of all the respondents that had a connection to the BACIWA did not experience problems with paying their monthly bill. Only 6 of the respondents claimed they have been cut off once, and then had to be reconnected again. These households have been cut off from services of the BACIWA because they did not pay their bill on time. They sometimes just forgot to pay the bill, or did not have the money to pay the bill on time.

The respondents that have a connection to the BACIWA are in all cases very content with their current water supply. They sometimes have problems with the pressure. These problems are primarily caused by the brownouts. And there are times that the water from the BACIWA is not good for drinking. In most cases the water is not good for direct consumption right after the brownouts. The water coming from the faucet then contains residue out of the pipes. In these cases the respondents often buy purified mineral water at the store. Some respondents do not trust the BACIWA water at all, and only use this water for cooking, cleaning, washing etc. They buy purified drinking water for direct consumption.

The survey also shows that from the respondents that did not have a connection to the BACIWA many of them also do not have any problems regarding obtaining access to a sufficient safe water supply. There are many houses in the purok that do have a connection, and they can buy their water supply there. In all other cases there are still a few hand pumps and dug wells which can be utilized for all other water necessities. Thereby, the respondents that do not have a connection to the BACIWA claim they would like to get a connection in the near future. The main problem is that they need to fulfil all the requirements in addition to the costs of getting connected. In the next paragraph the above reviewed data is analysed in more detail.

5 ANALYSIS

This chapter will analyse the data presented in the previous chapters. The main differences in availability, access and use of water supplies, as well as several striking similarities in and between the case study areas are examined in more detail.

"When the well is dry, we learn the worth of water"

Benjamin Franklin

5.1 INTRODUCTION

In the previous chapter the vast differences between the water supplies Bacolod City and the case study areas have been outlined. The respondents in all the case study areas have expressed a variety of uses of diverse water supplies, as well as opinions and perceptions on their current water supply and the possible improvements of these water supplies. In this paragraph the differences within and between the case study areas are analysed.

Apart from a few commonalities in the results from the survey there are a lot of striking differences that can be indicated. The comparison of these differences is structured according to the three key elements of household water security i.e. the availability, access and use of household water supplies. In the first part of this paragraph there will be a review of the different available water supplies in the case study areas. Some aspects of the household's access to these available water supplies are examined in this paragraph as well. The second paragraph will look at the access and use of the available water supplies and the differences between the households and case study areas in more detail.

5.2 COMPARING DIFFERENCES IN AVAILABILITY

This part of the chapter will start with examining the differences in the availability as well as introducing several characteristics in the access to available water supplies in and between the case study areas. In the first place the availability of water refers to a high and reliable supply of water as a resource (see figure 1.2). In the city of Bacolod there are presently no direct problems as regards the availability of water as a resource. There are however some problems on a more local and household level on the subject of the availability of drinking water sources. This paragraph will review these differences.

The previous chapter already indicated that there are many different water supplies available in the city of Bacolod. Approximately 30 percent of the city is actively served by the BACIWA. The majority of the remaining 70 percent, which draw on alternative water supplies, depend on the almost everywhere available public hand pumps. These hand pumps are regularly provided by the DPWH or the CE in cooperation with the LGU. In addition to the use of alternative public sources, the remainder of the residents in Bacolod City utilize predominantly private sources as for example purified drinking water supplies at refilling stations, private hand pumps and deep wells, peddlers etc.

In this research the focus has mainly been upon the 70 percent of the residents that are not actively served by the BACIWA. The households in four out of the five case study areas do not have the option to access the BACIWA services. The main reason why these areas are not served by the BACIWA is caused by their physical geography and location within the city. As can be seen in figure 3.4 in chapter 3, the BACIWA service system only provides a small geographical area with water supplies, predominantly in the city centre.

These areas served by the BACIWA are often located near the main water sources i.e. the deep wells or spring sources, in and around the older piped system and in the areas where there are many commercial or governmental buildings. When an area however is located on the edge of the city, as is the case of barangay Punta Taytay, it will be very difficult for the households to connect to the BACIWA service system. The BACIWA does have plans to connect the areas, which are presently not yet connected, by means of the Phase III improvements and developments plan (see paragraph 3.4.1).

Another major determinant in the households' ability to obtain access to BACIWA services is the geographical location of the house as regards the main water lines. These main water lines are regularly located near the main roads. The households in areas located far from the main roads often have difficulties to connect. In their efforts to connect to the main water lines the residents have to pay for the extra costs themselves. This was also the case in purok Sawmill, which is located in barangay Bata. There were several main water lines available in barangay Bata. The households in purok Sawmill however are located far from these main water lines and the residents have not been able to organize or pay individually for the costs to extent this water line into the purok (see appendix 5).

When a hand pump is installed, the functioning of the hand pump often depends on the geographical and physical location of the case study area as well. For example, three of the five case study areas are located in barangay Punta Taytay. This barangay is located on a coastal area and is surrounded by active and inactive fishponds. There are many hand pumps available in the barangay. The main problem is however that the saline intrusion has made the water from these sources salty, and these sources can therefore not be used as a drinking water supply. Another problem is that the hand pumps in these areas are not very reliable, as they frequently break down and show defects. This is thought to be caused by the salty environment which causes the iron hand pumps to corrode rapidly.

A lot of the households in the case study areas of Kapawa, Masipag and Paraiso have indicated that they do not make use of the hand pumps for their drinking water supply. The water coming from these hand pumps can not be used for drinking because of the saline intrusion. The majority of the respondents depend on peddlers that sell them containers with drinking water. This water is collected in a nearby barangay and therefore is not affected by saline intrusion of groundwater sources. Even though the quality of the water is questionable, the hand pumps are still widely used for all other purposes.

The geographical location of the puroks is the main determinant for the differences in the quality of groundwater sources and the water coming from the hand pumps. In the case study area of Sawmill there are many public hand pumps available. There are however no apparent problems with the quality of the groundwater resources. The residents in this area thus mainly depend on the hand pumps for their drinking water supply. These hand pumps are also widely used for all other purposes.

There are only few households in purok Sawmill that make use of other sources for their drinking water supply i.e. a private deep wells with electric pump, purified water or a private hand pump. In the case study areas in barangay Punta Taytay there are also a few households that utilize private sources in addition to the other household which mainly depend on public hand pumps. These differences in use of other alternative water supplies within the puroks are predominantly caused by the financial opportunities of a household to install a deep well, a private hand pump or buy purified drinking water (see also paragraph 5.3.1).

Last element in this paragraph concerning the availability of and access to available water supplies are the timely and seasonal differences. The seasonal difference is often one of the major determinants in the availability of water as a resource. The research was conducted at the end of the rainy season, and at the start of the dry season. This has had a direct influence on the information gathered in the survey. In the first paragraph of the previous chapter this fact already has been acknowledged. The seasonal differences thus have not directly been measured by the survey. There is however some knowledge on the seasonal differences as regards the availability of sufficient safe water supplies for the households in the various case study areas.

In the first place the respondents in purok Magnolia, where the majority of the respondents depended on BACIWA services, stated that there are no direct seasonal differences in the availability of water supplies. They do however have a higher water bill in the dry seasons. The BACIWA also declared that they do not have any problems as regards the seasonal differences in providing sufficient safe water to their consumers. In regard to timely availability of water supplies in this purok there are some features that need to be mentioned. When there is a brownout, the BACIWA has problems with the pressure in the water system. In some areas in Bacolod City, in particular the elevated areas, this could mean that there is no water coming from the faucet. In purok Magnolia this does not occur as the area is not situated on a higher level than its surroundings. There is however less water coming from the faucet after and during a brownout.

In the other case study areas the respondents also stated that they do not have any direct problems with the availability of water supplies which could be caused by the seasonal differences. In the dry season there are sometimes problems with low water tables in dug wells. In all the case study areas in Punta Taytay the respondents claimed that they sometimes have problems with the water supplies coming from the hand pumps. Especially during dry season, the water from these hand pumps is more salty than in the rainy season. This does not occur in purok Sawmill, where most of the respondents also make use of the hand pumps as their main water supply. These differences can be assigned to geographical location of the puroks and the available water supplies that are utilized by the households.

The households in the case study areas of barangay Punta Taytay however do not depend on the hand pumps for the drinking water supply. The drinking water supply, which is predominantly obtained from peddlers, is not directly affected by the seasonal differences. In some cases the peddlers however do not supply water to a household on time. The respondent claimed that in these cases they ask another peddler if he/she may perhaps bring them a container of water. When this is not possible, households sometimes collect the water in the nearby barangay themselves or simply use the salty water from the hand pumps and wait until the peddler does deliver the water.

It can thus be concluded that the differences in and between the available water supplies in the case study areas are for the most part caused by the geographical location and physical characteristics of the areas. In this analysis it has also become clear that the major differences occur between and not within the barangay in which the case study areas are located. The available water supplies within barangay Punta Taytay show several variances, but these are not as clear as the differences between the case study areas which are located in other barangays. In the next paragraph the differences in access to and use of the available water supplies are examined in more detail.

5.3 COMPARING DIFFERENCES IN ACCESS AND USE

In the previous paragraph it has become clear that access to a sufficient safe water supply mainly depends on the availability of water supplies. This chapter will review the access to the available water supplies in more detail. In the analysis of the access to a water supply, this paragraph will predominantly focus upon the drinking water supplies. Securing access to available drinking water supplies depends on several additional elements i.e. financial resources/income, allocation principles, sufficient quality and quantity of available supplies etc. In this paragraph notice is given to the differences and similarities in and between case study areas, in particular as regards the household's access to a sufficient safe drinking water supply as well as the improvements needed.

In addition to securing access to sufficient safe drinking water supplies, the actual consumption or use of water needs to be taken into account. The differences in the actual use of the water supplies have been important in this research. This paragraph will mainly focus upon the differences and similarities in and between the case study areas on the subject of the knowledge on appropriate use as well as the perceived quality of the drinking water. First the differences in the household' access to sufficient safe drinking water supplies will be reviewed in more detail.

5.3.1 COMPARING HOUSEHOLD ACCESS TO DRINKING WATER SUPPLIES

In all cases various water supplies for a variety of purposes are available in large quantities. However, this is not always the case with the access to sources needed for the drinking water supplies. In many cases the households' access to available drinking water supplies depends upon the financial ability to pay for these supplies. In this research however there was one exception.

In the case study area of purok Sawmill, the majority of the households stated that they do not need financial means to obtain access to drinking water supplies. The households in purok Sawmill predominantly utilized the public hand pumps, which were made available to the households by the DPWH or the CE at no costs. The only costs the respondents in Sawmill have in regard to their source of drinking water supply are the regular maintenance costs of the hand pumps. The main reason why these households do not pay for, or try to access alternative drinking water supplies, is that the quality and quantity of the water originating from the public hand pumps is sufficient to meet their standards. Another explanation would be the fact that the households in purok Sawmill do not have any alternative drinking water supplies available nearby. The lack of alternative drinking water supplies, as for example a piped water supply from the BACIWA, can in turn be assigned to the inability or lack of willingness of the residents to organize and pay for an extended water line to the main BACIWA water line next to the main road nearby.

In the other survey areas the majority of the households however did need financial resources to obtain access to a sufficient safe drinking water supply. In all the case study areas located within barangay Punta Taytay for example the households have to pay peddlers for the delivery of drinking water. These peddlers in turn have to pay a fee to the owner of the water supply they utilized to collect the water from. Even though the costs of the water supplies are not particularly large, it is still 10 times the price they would have to pay for the same amount of water if this was delivered by the BACIWA. The households in these case study areas however often do not have a choice but to buy the water from the peddlers, because there are simply no alternative public drinking water supplies available in the purok.

The households in purok Magnolia have to pay the BACIWA, or the household they buy the BACIWA water from. When the respondents were asked their opinion on the water rates, the majority claimed that the rates were too high. However, only 10 percent of the respondents ever had any problems with paying the bill. The households that buy their drinking water from a nearby house that has a BACIWA connection pay a similar price as the respondents in barangay Punta Taytay have to pay the water peddlers. Other alternative water supplies the households utilized also required financial resources as for example with purified drinking water supplies. However, in all case study areas only a few respondents stated to utilize this drinking water supply. It can be concluded that the main differences as regards the financial needs to pay for a drinking water supply between the case study areas thus largely depend upon the available water supplies and the choices households make as to which drinking water supply they utilize.

As already mentioned in the previous paragraph there are large differences in the available water supplies in and between the case study areas. The respondents were questioned on their satisfaction with these available water supplies. Even though there were large differences in the available water supplies, in all case study areas the majority of the respondents were very much satisfied with their current water supply. The main reason for this was most probably the fact that the respondents at that time had no explicit problems in collecting sufficient safe water for their daily needs.

In addition to the question if they were satisfied with their current water supply, the interviewees were asked if there were any improvement needed. The majority of the respondents in all areas have stated that they would like to have access to an improved water supply. A piped water supply with a faucet in or near the house was regularly seen as an improvement. Only in barangay Punta Taytay the households had an alternative piped water supply system, in addition to the BACIWA services. However, this alternative did not supply safe drinking water and is therefore not considered in this analysis. An improved water supply thus would be a connection to the BACIWA services.

While the hand pumps are suitable drinking water supplies in some areas, the large part of the respondents in all the case study areas are still willing to pay for a connection to the BACIWA. The main reason given for the fact that they are willing to pay for a connection to the BACIWA is similar in all cases. In particular the comfort of having a private faucet and better quality of water is very appealing to the households that, at present, do not have a connection to the BACIWA services. In purok Magnolia many residents already make use of the BACIWA services. They are often very satisfied with this particular water supply.

In the application to access the BACIWA services the respondent in purok Magnolia did not have many difficulties. The land on which purok Magnolia is situated is increasingly being legalized and many of the households with a connection to the BACIWA have had this connection for a long period of time. In the survey areas located in barangay Punta Taytay and purok Sawmill however the land ownership could still cause problems for the residents in applying for a BACIWA water connection in the future. Since 1998 there are strict requirements formulated by the BACIWA as regards the connection of squatters. Many of the respondents in Punta Taytay and purok Sawmill are illegal squatters and therefore will have difficulty completing the requirements needed for a private connection. The costs of connecting to the system are often a major problem as well.

However, the alternatives e.g. a communal faucet or spread of payments are making the household connection increasingly more attractive. In cases where a communal faucet would be a solution, the communities would have to organize themselves. A good example for the option to install a communal faucet from the BACIWA would be the case of the former squatters in Hidden Paradise in Bacolod City (see appendix 5 and the additional DVD). The main differences in reference to the possible access to BACIWA services thus largely depends upon the geographical location of the household vis-à-vis the main water lines, as well as the household' status as regards the ownership of the land. A similarity in reference to a household connection to the BACIWA is that the majority of the respondents in all case study areas assumed that they could not afford to pay for the connection. The financial requirements thus play an important role in the possibilities of a household to access the BACIWA services as well.

In many of the cases the public hand pumps are still utilized as a main supply of water. In the previous paragraph it has been agreed upon that the functioning of the hand pumps was depended of the geographical and physical location of the case study area. In addition it can be noted that the geographical and physical location of the hand pump *within* the case study area is of importance for the household access to this particular water supply as well. When there are no piped water supplies available to provide the households with safe drinking water, the household depend on alternative water supplies e.g. the public hand pumps. These alternative water supplies are however not always available nearby. When these sources are not nearby, the members of a household often have to travel long distances to obtain access to a sufficient safe water supply. This could cost a lot of time. In the case study areas of this research however that was not an existing problem. In all the case study areas there were many alternative water supplies i.e. hand pumps available all over the area. But, there were several other differences in and between the case study areas.

The main differences between the case study areas on the subject of public hand pumps was the fact that in barangay Punta Taytay the hand pumps did not supply the households with safe drinking water. This difference was mainly caused by the physical geography of the case study area as well as the location of the hand pumps in the areas. Another main difference regarding the availability of hand pumps occurred in purok Magnolia. In this purok there were less public hand pumps available than in all the other case study areas. The main reason for this difference is the fact that in purok Magnolia the BACIWA already provided many households with piped drinking water supplies. Therefore the DPWH and the CE were not providing additional hand pumps in this purok, as compared to their services in the other case study areas.

The conclusion drawn from the above stated analysis is that the access to a sufficient safe drinking water supply in most cases depends upon the physical geography, the location of the case study area as well as location of the household as regards the available water supplies. The availability of water supplies is also a major determinant in the opportunities of households to access a sufficient safe drinking water supply. In some cases the financial resources play an important role in the differences relating to obtaining access to drinking water supplies. This however depends on the choices households make and the availability of alternative drinking water supplies.

There are large differences in the availability of sufficient safe drinking water supplies and the possibility to access an improved water supply i.e. a piped water supply from the BACIWA between the case study areas. The majority of the respondents in all case study areas are definitely willing to pay for access to these improved water supplies. There are however many obstacles for the residents of squatter areas to actually connect to the BACIWA. Variations in the opportunity of access to improved water supplies from the BACIWA between the households and the case study areas are mainly caused by the local availability of the BACIWA water lines; meeting the requirements for an initial connection; the household's ability to pay for the initial connection; and the ability to pay the monthly expenses. It can be concluded that the main differences in relation to the access or opportunity to access sufficient safe drinking water supplies occurred amid the case study areas in the different barangays. The last part of this paragraph will examine the differences in the water quality and actual use of available water supplies in and between the case study areas.

5.3.2 DRINKING WATER QUALITY AND USE

Most respondents in all the survey areas have stated that they are very content with their current water supplies. There were however several issues as regards the quality of the water from these water supplies. In many of the cases little or no attention is paid to the quality of the water. To find out the respondent's perceived quality of their drinking water supply they were asked if they feared to fall ill from their current drinking water supply.

In particular in the case study area of Magnolia a high percentage of respondents stated that they fear to fall ill from drinking water. The main drinking water supply in this case study area is provided by the BACIWA. In all the other areas there are no households which make use of BACIWA services. Even though more than half of the respondents in the other case study areas stated to fear falling ill from their drinking water supply, there is no clear explanation why this figure is much higher in purok Magnolia. It was even expected that the perceived quality from the BACIWA water (which is treated with chlorine) was higher than the perceived quality of the water from alternative water supplies as for example the hand pumps (where the water is often not treated). A possible explanation for this result might be that the residents in purok Magnolia have a higher standard, and are more aware and better informed on the quality of their drinking water supply than the residents in the other case study areas. This difference can then be caused by the fact that the BACIWA informs their customers on the proper use and quality of water supplies. Unfortunately this assumption can not be verified by the results of the survey.

Several respondents have had at least one household member that has fallen ill from the drinking water supply they utilized. The main disease caused by water, mentioned by the majority of the respondents in all case study areas, was diarrhoea (caused by consuming dirty water). So even though there are many different drinking water supplies utilized between the case study areas, there are no large differences in the diseases caused by drinking water. The majority of the respondents however also stated that they do not take precautions to ensure the safety of the water either. Especially in the case study areas of Masipag, Paraiso, Sawmill and Magnolia a large majority of the respondents stated not to take any precautions to ensure the safety of the water. These results have been very difficult to explain, as the drinking water supplies and the use of these water supplies in all three cases are very different. The conclusion is that falling ill from or taking precautions to ensure safety of the drinking water supply does not depend on the variety of drinking water supply that is utilized.

Another important aspect in this research is the proper use and disposal of the water. Many times the water is disposed off near a source. In none of the case study areas there are appropriate drainage systems available. Several people (BHW and sanitary inspectors) and public agencies (CHO, BACIWA, and LGU) are responsible for informing the people on proper use and safety of the water supply. There is however a clear general lack of knowledge on the proper use and disposal of the water supplies. There are however some differences that can be indicated.

The majority of the respondents in Magnolia and Paraiso claimed they did hear or received information on conserving water. As a consequence a large percentage of the respondents in these two research areas also claim to make use of conservation methods. Many respondents in purok Magnolia make use of BACIWA services. The BACIWA informs the people by TV and radio commercials, as well as provides handouts with water saving tips (see figure 4.8). The main reason for the fact that the majority in purok Magnolia have more knowledge on the use and also actually make use of conservation methods could be assigned to the fact that the BACIWA informs their customers on the proper use of a water supply.

The majority of the respondents in Sawmill, Kapawa and Masipag stated not to make use of conservation methods. A clear explanation why the majority of the respondents in Paraiso claim to have received information, and why half of the respondents actually make use of conservation methods, can not be formulated by the researcher. The figures in this case however are not as apparent in difference from the other case study areas as they were in the case of purok Magnolia. Many of the respondents in purok Sawmill, Kapawa and Masipag claimed that they do not make use of conservation methods because they do not have to pay for its use i.e. the public hand pumps. This is however not the case in purok Kapawa, Masipag and Paraiso, where the households have to pay peddlers for their drinking water supply. Why they never actually heard of any conservation methods can be caused by insufficient guidance of the people and public agencies that are responsible for informing the people on these practices.

It can be concluded that the main differences in the household's perceptions on the quality of the water are predominantly caused by the variations in the available water supplies. This is particularly the case on the subject of knowledge of the households on the proper use of the drinking water supply. The perceived quality of the water from the different available water supplies was expected to differ to greater extends. In this research the measured perceived quality of the water supply however did not show large variances in and between case study areas. It thus can be concluded that, the main differences as regards the quality and use of water supplies in and between case study areas, depend largely on the available water supplies and the choices households make in reference to the utilization of these water supplies. As a consequence these differences have occurred predominantly between the case study areas which are located within different barangays, and not within a barangay or purok.

6 CONCLUSIONS AND RECOMMENDATIONS

This chapter will deal with the formulated research questions, as well as attempt to provide some recommendations on improvements and future developments as regards the household water supplies in Bacolod City. The last paragraph will present a retrospective on the collection and analysis of the data in this research.

Water is the source of all life”
Koran, 21:30

6.1 ANSWERS RESEARCH QUESTIONS

The goal of this research was to explore and describe the household’s access to available water supplies in Bacolod City. The main subject in this thesis is the perception and behaviour of the residents in squatter areas vis-à-vis their access to a sufficient safe water supply. In this last chapter the research questions that have been formulated at the start of the research will be addressed. The first paragraph will deal with the first four questions. In the second paragraph the last question in the form of recommendation/thoughts for improvements are outlined. The first question that will be addressed is the following:

1. What are the roles of the public and the private sector in securing the availability of a sufficient safe water supply for the households in Bacolod City?

The availability of water, according to the conceptual framework of household water security, constitutes a high and reliable supply of water as a resource. The availability depends upon the supply (1) and distribution (2) of water (see figure 1.2). The watersheds play a critical role in ensuring a sufficient supply of water resources. Securing the availability of a sufficient safe water supply will therefore first be reviewed on a regional level in reference to the Bacolod City watershed. The second part of this paragraph will evaluate the available public and private water supplies on the city level.

The residents in Bacolod City depend on groundwater resources as their main source of water supply. The alternative water resources i.e. the surface water and the rivers in Bacolod City, are severely polluted and therefore not suitable to be utilized as an alternative water supply. According to several informants there are presently no real problems as regards the availability of groundwater resources in Bacolod City. There are however several depleted areas in Bacolod City where the groundwater resources are low or affected by the saline intrusion. The availability of water as a resource in Bacolod City hence is geographically unevenly distributed.

The management of water resources in the Philippines is largely an inter-sectoral affaire. This constitutes large, complex managing structures. Presently the managing of water resources in Bacolod City is the responsibility of several public agencies e.g. the LGU’s, local and regional departments of the DENR, the Water District, NWRB etc. The main private sector organization involved in the management of the resources in the Bacolod watershed is a local NGO called the NFEFI. The NFEFI, in addition to the works of the LGU’s, the DENR and the BACIWA, is managing the resources of the Bacolod City watershed, better known as the Caliban-Imbang Watershed. In regard to the Bacolod aquifer, the National Water Resource Board in cooperation with the BACIWA is incidentally monitoring the groundwater resources of Bacolod City. In practice the BACIWA has conceded the authority to manage and monitor the groundwater resources of Bacolod City. The BACIWA currently however does not have the capacity to actually perform the functions in addition to their regular functioning as a water district.

As a conclusion it can be noted that on a regional level there are several public and at least one private organizations involved in the management of the availability of water i.e. in the watershed of Bacolod City. In this case there is no or little cooperation between the agencies responsible for the planning and management of the water resources. There is some type of public-private partnership concerning the public agencies and the NFEFI. These partnerships are however only incidental and project based. There is a clear need for a more integrated approach in the management of the Caliban-Imbang watershed and the water resources. The main users of these resources should also become more actively involved in the management and planning. This eventually should help to ensure the future availability of groundwater resources in Bacolod City.

The next part of this paragraph will review securing the availability of sufficient safe water supplies on a local and city level. The main subject in the following examination is the distribution (2) of water supplies to the squatter areas in Bacolod City (see figure 1.2). There are many different water supplies which have been made available to the households of Bacolod City. Approximately 30 percent of the city is actively served by the Bacolod City Water District. The remaining 70 percent draws on alternative public and private water supplies. First the public water supplies on the city level are examined.

On the city level there are various public agencies involved in the supply and distribution of water to the households. In the first place there is the local water district, in this case the Bacolod City Water Authority (BACIWA), which is responsible for the provision of piped water supplies in the city. The BACIWA is a quasi public, non-profit, self sustaining organization that operates autonomously and without interference from the LGU. The BACIWA's main objective is to provide level 3 water supplies i.e. individual household connections.

The majority of the residents in Bacolod City however utilize the alternative public water supplies. These water supplies are often provided by the Department of Public Works and Highways (DPWH) and the City Engineers (CE). The main objective of these public agencies is to provide the households in the city with level 1 and 2 water supplies i.e. communal faucets including distribution systems and point source systems (primarily hand pumps). The Local Government Units (LGU) are responsible for the applications in which the services from the DPWH and the CE are requested. The barangay officials also have the possibility to construct their local water supply system with support of the DPWH or the CE. The choices in reference to the installation of water supplies from the DPWH or the CE mainly depend upon the origin of the financial resources.

It can be concluded that on a city level there are several public agencies involved in securing a sufficient safe water supply for the households in Bacolod City. There is however no or little cooperation between these agencies as regards the planning and management of the water supplies. The BACIWA, LGU, DPWH and the CE do not coordinate in their efforts to provide water supplies to the households in the city of Bacolod. In some cases these public agencies actually compete with each other for the financial support from the national and/or city government. There is thus a clear need for these agencies to coordinate their activities and cooperate instead of competing. This also goes for the relative context of the public and the private sector. The next part of this paragraph will look at the private sector in more detail.

In the private sector there are many different actors which provide the households in Bacolod City with sufficient safe water supplies. In the first place there are several water supply systems available in the subdivisions of Bacolod City. According to PD 957, the developers of subdivisions are obligated to provide every house with a sufficient safe water supply. These water supply systems are often constructed under the supervision of the BACIWA. Only few subdivisions still operate and manage their own water supply system. The majority of these systems are turned over to the control of the BACIWA. In these cases the private sector cooperates with a public agency in securing sufficient safe water supplies for the residents in subdivisions. However, the majority of the urban poor, in particular the squatters, do not have the possibility to attain access to these water supplies.

The residents of Bacolod City also have the opportunity to secure sufficient safe water supplies themselves by constructing a private dug well, or drill a deep well and install an electric or hand pump. This second variety is very widespread among the better off households in Bacolod City. The urban poor however often do not make use of these kinds of water supplies as they are costly. In the case of constructing a private deep well there are some regulations. When the casing of these deep wells does not exceed 4 inches in diameter, and the well is set up on private property, there are no permits needed for the drilling and extracting of the water. Only in case that these regulations are exceeded, permission is obligatory from public authorities i.e. the NWRB, or the LGU. In Bacolod City the task of authorizing the permit for drilling is performed by the BACIWA. In all other cases there is no involvement of the public sector required.

A third variety of securing sufficient safe water supplies in the city of Bacolod are the purified water supplies. The formal private sector provides households with water supplies by selling purified water at refilling stations located across the city. Additionally there are many water bottling companies who sell bottled purified water at the local stores (as well as at the local sari-sari stores). It is presumed that in some cases the refilling stations purify the water from the BACIWA more thoroughly, and then sell this water to their customers. There is however no direct cooperation between this private sector water supply and the public sector.

The fourth private sector water supplies, however informal, are the peddlers. The peddlers collect water from a private or public potable water source. This water is then sold to household that do not have a potable water source near the house. In other cases the households can buy water directly from a household that does have a private faucet (from the BACIWA or private deep well). In these informal water supplies the residents pay 5-10 times more than the households that have access to a potable piped water supply have to pay for the same amount of a better quality water. Nevertheless, these water supplies are highly important for low-income families that can not afford to buy purified bottled water, install a deep well or obtain a private connection to the BACIWA or make use of other public water supplies that provide safe drinking water. Because of the informal status of these peddlers, the public sector does not cooperate with these private water supplies.

Following this analysis of public and private water supplies in Bacolod City, it can be concluded that the roles of the public and private sector in securing sufficient safe water supplies is very diverse. The main problem is that there is little or no cooperation or coordination within and between the public and private sector and thus no form of public-private partnership. As might have become clear, are the majority of the urban poor households' dependent upon the informal water peddlers and mainly alternative public water supplies. In line with the main subject of this research i.e. access to water supply by the urban poor, the focus of the next question is mainly upon the public water supply.

2. Does the public sector in Bacolod City encounter any problems in securing the availability of a sufficient safe water supply by the households?

On the regional level the availability of a sufficient safe water supply is dependent upon the water resources. The residents in Bacolod City mainly depend on groundwater resources for their household water supplies. In assuring the availability of groundwater resources the main water users should avoid mining of the aquifer. This requires the water withdrawal to be limited to the net natural recharge of the aquifer (Widstrand, 1980). However, the main problem that the public agencies in Bacolod City encounter is that there is a general lack of sufficient monitoring of the water withdrawal, as well as a lack of knowledge on the net recharge of the aquifer. Conflicts come into existence because there are many different users and managers of the groundwater resources. The main problem thus is that there is a clear lack of an integrative mechanism to interrelate the different functions and agencies that utilize and manage the water resources. The next part will review the problems public agencies encounter in securing the availability of sufficient safe water supplies on the city level.

The BACIWA is the main public agency in charge of securing the availability of piped water supplies in Bacolod City. However the BACIWA struggles with several main problems in the management and operation of their water service system. In the first place the present management of the BACIWA still come across issues which originated from the mismanagement of a former administration (mismanagement). Secondly there are many problems with financing the improvements and development plans. For improving and extending the service system, the BACIWA needs to take on considerable loans from the LWUA. A third problem related to the previous issue is the aged water supply system, causing high maintenance and operation costs as well as leakages. This is one of the main reasons for the high percentage of Non-Revenue Water (NRW). A large amount of water is lost even before it can reach the connected households. The second reason for the high percentage of NRW is that many people illegally tap water from the BACIWA lines, and there are numerous spaghetti connections. The BACIWA has already developed various programmes and plans to deal with these issues. However, solving these issues is not an easy task.

Other public agencies responsible for securing the availability of water supplies i.e. DPWH and the CE also encounter several problems. The main problem the DPWH and the CE encounter is that the alternative water supplies, mainly hand pumps, do not always provide potable or sustainable water supplies. The hand pumps often extract water from shallow wells, which are easily polluted and are the first to fall short when water tables decline. The quality of the water from these hand pumps is doubtful, since the water is often untreated. The hand pumps themselves have an average lifespan of 6-24 months and often break down. Nevertheless, spare parts are easy to obtain in the local hardware stores and the hand pumps are fairly easy to repair. When a hand pump breaks down, and the budget of the DPWH or CE allows it, they will be replacing the hand pump. In other cases the people collect money to repair the hand pump themselves. An additional main problem encountered by the DPWH and the CE concerning the provision of sufficient safe alternative water supplies is their budget. Both agencies claim that their budgets do not allow them to install sufficient hand pumps for all the communities in Bacolod City that are not served by the BACIWA. There are thus choices to be made as regards to where to install a hand pump, and when this cannot be accomplished. In addition, the installation of water supplies does not have a priority in both the DPWH and the CE their policy.

It can be concluded that the public agencies currently still encounter many problems in securing the availability of a sufficient safe water supply for the household in Bacolod City. Many of these problems can not simply be resolved overnight. The first improvement would be an integrative mechanism to interrelate the different agencies and stakeholders involved in the management of water resources. In addition there is little or no communication between the LGU, DPWH, CE, as well as with the BACIWA as regards the planning and management of providing water supplies and the extraction of water resources. It is assumed that privatization, or a mixture of the public and private sector (public-private partnership) in providing and financing basic services can help solve the problems that public authorities have in managing and providing adequate basic utility services. In the debate concerning the public-private partnership in water supplies, the role of the small scale private sector should not be overlooked. After the evaluation of the available water supplies, the question remains if the households have sufficient access to these available water supplies. This leads to the following question:

3. Are there any problems in the access to and eventual use of the available water supplies as perceived by the researcher and the resident in the squatter areas of Bacolod City?

The access to a water supply is partly determined by the effective demand (3), the consumption (4) and the distribution (2) of water i.e. the allocation of water resources (see figure 1.2). In the conceptual framework of household water security the actual use of water is determined by the consumption (4) and the enabling conditions (5). In this research the focus is mainly upon the distribution (2) of water supplies, household knowledge on the consumption and use (4), as well as the effective demand (3) of households. The focus of the next part is mainly upon the residents of squatter areas.

In the first place it needs to be noted that residents of squatter settlements often do not have the ability to access piped water supplies from the BACIWA. In many cases the residents of squatter areas however would like to have access to a piped water supply. The main problems encountered by households in the squatter areas as regards obtaining access to piped water supplies are the geographic locations of the housing unit (in reference to the main water lines); meeting the requirements for an initial connection (land tenure); the household's ability to pay for the initial connection; and the ability to pay the monthly expenses.

Some households in squatter areas already have a connection to the BACIWA, or share a connection with another household. When there are BACIWA services present in the barangay, and the household cannot afford to pay for a private connection, they often buy the BACIWA water from a household that has a private connection. In some cases there are community systems (that serve safe drinking water) or there is a communal faucet from the BACIWA available. However this has not been the case in the case study areas in this research. It can be concluded that even though many of the households in squatter areas are willing to pay for a potable piped water supply, they still encounter numerous problems in obtaining access to the piped water supplies from the BACIWA.

The majority of the residents of squatter areas depend upon the alternative public or private water supplies. In most of the squatter areas there are many alternative water supplies available in the form of public or private hand pumps. The water supply from these hand pumps is often not treated or adequately monitored. The quality of these water supplies is questionable. There is a general lack of knowledge among the respondents in the case study areas on the quality of the water coming from these hand pumps as well.

Though many people question the quality of the water, the majority of the household do not make use of safety measurements to prevent diseases caused by water. The water supply from these alternative sources is also not always properly used and disposed of. Many households do not make use of water saving measurements. There are no sufficient drainage systems available and the used water is frequently disposed of near the water source. This lack of knowledge on the proper use and quality of the water from alternative water supplies is one of the key problems in the use of water supplies by the households in the squatter areas.

Another main problem encountered by the households in the squatter areas of Bacolod City is the reliability and the functioning of the alternative water supplies. The alternative water supplies are not very long-lasting and do not always supply sufficient safe drinking water. The public hand pumps supplied by the DPWH and CE often have a short live span and the shallow wells that are utilized by the hand pumps sometimes do not provide sufficient safe drinking water. In particular during the dry season and in the marginal areas of the city (near polluted rivers, coastal areas etc) these hand pumps do not supply sufficient safe drinking water. In these cases the household have to buy water from peddlers. However, even though there are several problems encountered by the households in the squatter areas, it should be noted that in most cases the respondents were still very satisfied with their current water supplies.

The conclusion is that the residents of squatter areas in Bacolod City encounter a number of problems as regards the household's access to, and eventual use of sufficient safe drinking water supplies. The main problem is that, even though the majority of the households are willing to pay for a piped drinking water supply, they can not actually obtain access to the piped drinking water supplies of the BACIWA. The majority of the residents in the squatter areas of Bacolod City however still have access to sufficient alternative drinking water supplies. And even though these alternative drinking water supplies are not always very reliable and they supply water with a questionable quality, they are perceived as an adequate water supply. The major problem with reference to the use of the alternative drinking water supplies is the lack of knowledge on the proper use and quality of the drinking water supplies. The next part of this paragraph will focus upon the question of spatial differentiations in access to sufficient safe drinking water supplies.

4. Are there any spatial differences in the access to sufficient safe drinking water supplies for the households within and between squatter areas in Bacolod City? And if there are spatial differences in access to potable water supplies, describe the nature of the main differences.

There are spatial differences as regards the access to sufficient safe water supplies for households within and between squatter areas in Bacolod City. The main spatial difference between squatter areas is caused by the coverage of the service area of the BACIWA. The BACIWA presently covers approximately 60 percent of the city. The communities located outside this service area do not have the ability to obtain access to piped water supplies from the BACIWA. In addition only half of the residents within the service area are actively served. All other households are not able or willing to receive potable piped water supplies from the BACIWA. The differences in access to BACIWA services are predominantly caused by the physical geography as well as the locality of the settlement or the household within the settlement. The BACIWA serves primarily the residents in the city centre and the households located near the main water lines with potable piped water supplies.

In particular the residents in the more rural areas as well as the communities located far from the main lines have difficulties obtaining access to potable piped water supplies from the BACIWA. The squatter areas are often located outside the city centre, and far from the main roads. Additional costs related to the initial connection fees for households far from the main water lines are often a stumbling block for the low-income families living in the squatter areas. Another main problem as regards the exclusion of BACIWA services for residents in squatter areas is caused by the land tenure and the requirements needed for a connection. Since 1998 the BACIWA has added requirements in reference to land tenure in the application of residents of squatter areas. At present it has proven to be increasingly complicated for squatters to connect to the public piped water supplies in Bacolod City.

The residents of squatter areas predominantly utilize alternative public water supplies. The spatial difference concerning access to adequate alternative water supplies within and between squatter areas is predominantly caused by the physical geography of these areas as well. The squatter areas are often located in the marginal parts of the city (near polluted rivers, flood prone areas, elevated areas etc.). Providing sufficient alternative water supplies in these areas has proven to be difficult. An example of this spatial differentiation is illustrated in the coastal areas of Bacolod City. The residents in many of the coastal areas have problems with the saline intrusion. They need to utilize other alternative water supplies. The squatters however cannot always extract potable water from the available alternative water resources i.e. dug wells or public hand pumps. They have to buy potable water from peddlers or sources outside the areas which are not affected by the saline intrusion. A hand pump hence can provide sufficient safe water in one area, while the same hand pump does not supply potable water in the other.

It can be concluded that there are several spatial differences in the access to sufficient safe water supplies within and between squatter areas in Bacolod City. A finding in reference to this subject is that the major differences predominantly occur between the assorted barangays, and not within the barangay or purok. The nature of these differences lays for the most part in the physical geography as well as the location of the household vis-à-vis the available water supplies in Bacolod City. Financial resources to access water supplies also play a role in the spatial differences that occur in the access to sufficient safe water supplies. This was also already determined in chapter five.

6.2 RECOMMENDATIONS

This paragraph will deal with the last question of this thesis. In the research the three primary elements of the conceptual framework of household water security are applied to guide the gathering and analysing of the data. The last question will also be dealt with corresponding to these three primary elements i.e. the availability, access and use of water supplies. The following question will be addressed:

5. How can the main problems related to the availability and access to a sufficient safe water supply in Bacolod City be improved?

It needs to be noted that the following recommendations are based primarily on several interviews with key-informants and the household survey, and therefore should be interpreted with care. The recommendations are more 'thoughts' on possible recommendation, as the researcher does not nearly know everything about the household water supplies and the actual problems as regards the access to adequate water supplies in Bacolod City and the case study areas.

The first issue in this research is the key element of securing the availability of sufficient safe water supplies for future needs. The problem in Bacolod City is that at present there is no adequate monitoring and management of water resources. Though there are still sufficient safe water resources available in Bacolod City, there is a need for adequate management as well as sufficient monitoring of these water resources. Economic incentives and regulations e.g. economic values on water rights can be set up to accomplish this (UN, 2004). A major current development in the management of water resources is the Integrated Water Resource Management (IWRM). The IWRM calls for incorporation and integration of the socio human factors, the economic issues and the ecological system in the management of water resources (Matondo, 2001). The implementation of IWRM would be a possible solution to the current problems as regards the management and planning of water resources. The NWRB already called for the implementation of the IWRM based on the river basin as the direction for future water resources planning and investments.

Recent developments in thinking related to the planning and management of water resources recognize watersheds as the major element of an integrated approach. The Caliban-Imbang watershed is identified as the main recharge area of Bacolod City. In the management of water resources however it is essential to identify the exact recharge zones of the tapped aquifers. This is necessary to delineate the areas that shall need concentrated efforts for forest cover preservation as well as restoration. The BACIWA has developed a proposal in which they would like to use isotope tracers for identifying the recharge area of the BACIWA groundwater sources. Attention is already given to the upland development of the Caliban-Imbang watershed by a local NGO the NFEFI. By means of community based resource management, alternative technology and several other projects, the NFEFI in cooperation with the villagers and community organizations is trying to protect and conserve the watershed area. There is however still a need for financing and active participation and cooperation of the LGU's as well as the BACIWA with the NFEFI and the other stakeholder groups in the project developed in the watershed area.

The key element of water availability in the conceptual framework of household water security is also dependent upon the aspect of distribution (2). This aspect has been examined in this research by focussing upon the distribution of available water supplies on a city level. The core messages as regards the water supplies in developing countries are often based upon the need to extent and improve the existing water supply utilities. The main problem is that at present the BACIWA, the main water supply utility, covers only 60 percent of the city. By means of various development phases the BACIWA has attempted to extent their water services. However, they have not been able to keep up with the rapid growing population. The current water supply system has also been subject to deterioration. Investments are needed to improve the existing water supply system, as well as to extent the service coverage of the BACIWA in the city of Bacolod. The BACIWA recently initiated the phase III development programme. This programme is initiated to improve and extent the service system of the BACIWA.

The BACIWA is currently facing several management and operational problems. To deal with these problems the BACIWA could develop policies to prevent overstaffing; develop programmes to reduce the high percentages of NRW; prevent corruption as well as mismanagement by increasing transparency in operations; empowering civil organization via information and direct involvement of stakeholders, rationalization as well as enforcing existing laws. At present the BACIWA is putting much effort in dealing with their current management and operation problems. There are already several initiatives taken to countermeasure the problems. These problems however can not be solved overnight.

In regard to the alternative water supplies, which are predominantly supplied by the DPWH and the CE, there is a need to increase budgets and put water supplies as a priority on their agenda. Better communication among the DPWH and the CE, as well as with other governmental institutions (LGU, BACIWA) could also improve the functioning of these public services. In addition it is necessary to increase knowledge and monitoring of the quality of the alternative water supplies provided by the DPWH and the CE. Informing the people on the use and quality of the water is very important.

The next part of this chapter will review recommendation on the two key elements of access and use on the local and household level. First of all it should be noted that, although there were vast differences in availability and accessibility of water supplies in the squatter areas that have been surveyed, the majority of the respondents have stated that at present they are very content with their current water supply. However, there were some aspects that could be improved.

The first issue related to the access to and use of water supplies is to improve the access to a piped water supply. Most of the respondents in the survey areas have stated to be willing to pay for improved water supplies in the form of a connection to the BACIWA. Research has shown that the low income families in urban areas are often quite willing to pay for piped water supply (McIntosh, 2003). However, the high initial connection fees keep them from being served. The setting up of schemes as regards making these initial connection fees affordable is therefore recommended. Another option would be the communal faucet. The BACIWA already has developed various schemes as regards the affordability of connection fees as well as the user fees and communal faucets.

Legalizations of squatter settlements have also shown to improve the ability and willingness to invest in basic services i.e. adequate safe water supplies. In addition the BACIWA and LGU's should adopt flexible approaches in the provision of water supplies to unauthorized settlements and base their decision on commitments to pay for services. Priority should be given to the low income households that depend on peddlers or water sources from outside their communities, for the reason that there is a lack of sufficient safe drinking water supplies available nearby. Although the services of the peddlers are currently a sufficient alternative for many residents, they are often not very reliable. The quality and sustainability of the current alternative water supplies in squatter areas that are not served with piped water supplies is questionable. More durable supplies e.g. different types of hand pumps as well as adequate monitoring of the quality and quantity of the water coming from these sources is required.

A concluding recommendation in reference to securing the access to sufficient safe water supplies of households in Bacolod City is the need for developing 'watertight' policies. The specific needs and vulnerabilities of the low-income households should stand central in formulating sound and equitable water strategies (McIntosh, 2003). This can only be realized if the low-income households are involved in the formulation of water strategies. The people need to be educated and communities should be organised as to have a voice in decisions made on securing sufficient safe water supplies. A good example for this would be the success story of "Hidden Paradise" (see appendix 5 and the additional DVD). In the last paragraph of this chapter the use of the conceptual framework in this thesis is reviewed.

6.3 CONCLUSION

To conclude this thesis it is essential to reconsider several significant features of the research. In the first place it needs to be acknowledged that the use and applicability of the conceptual framework of household water security in this research has been very limited. The concept of household water security in first instance was very much related to the main subject of this thesis i.e. household access to sufficient safe water supplies. However, even though the conceptual framework provided a supportive guideline in the collection and analysis of data, there have been several difficulties in the application of the exact connotation of the framework. The difficulty with the application of the concept to this research was primarily caused by: the inexperience of the researcher; the lack of an alternative corresponding theory vis-à-vis the subject of the research (or at least not known by the researcher); the fact that the framework was only conceptual; as well as the fact that the requirements in the framework did not match the objectives of this research.

A second facet that needs to be emphasized again is that the data presented in this thesis is not without errors or biases and cannot be considered as valid for the barangays or Bacolod City, nor for squatter settlements within the city. The data for this research is primarily gathered during the dry season and at the start of the rainy season. The results of the survey are therefore seriously influenced by the seasonal differences that are inherent to the household access to water supplies. In addition it needs to be noted that several complications occurred in the collection of data, as the researcher did not have the suitable experience. Precaution with the use and interpretation of the figures and results presented in the research is thus recommended.

The last issue that needs consideration is the rationale of this thesis. This research is mainly performed for descriptive and explorative purposes. The presented information offers initial information on the perceptions of households, and possible solutions for improvements as perceived by the households and the researcher with reference to household water supplies in Bacolod City. The data and the analysis of this data however have directed attention to several main issues as regards the availability and the household access to adequate water supplies in squatter areas. Several other main issues have not been taken into account. These issues can be subject for further research, as for instance the issue of gender in securing access to water supplies; actual water quality of the available water supplies; making use of GIS in identifying, protecting and rehabilitating the watershed area; measuring, monitoring and managing the available water resources on a watershed level etc. This thesis thus can serve as an input for continuing discussion as regards improving the access to adequate water supplies for the residents of squatter areas and the urban poor households within the city of Bacolod.

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APPENDIX 1: PHILIPPINE POLITICAL MAP



Source: University of the Philippines, National Institute of Physics. Available at:

<http://www.nip.upd.edu.ph/photonics/contact/philippines.html>

APPENDIX 2: NATIONAL STATISTICS: FAMILIES BY MAIN SOURCE OF WATER SUPPLY

Families by Main Source of Water Supply
in the National Capital Region, by Income Stratum and Urban-Rural Residence: 2002

Income Stratum	Number of Families ('000)	Families With Electricit (Percent)	Main Source of Water Supply							
			(Percent Distribution)							
			Own Use Faucet	Shared Faucet	Own use Tubed/ Piped Wall	Shared Tube/ Piped Wall	Dug Well	Spring, River, Stream	Rain	Peddler
PHILIPPINES	15,925	79.0	32.6	16.5	13.3	17.6	9.4	6.1	0.4	3.6
Lowest 40%	6,370	55.9	12.1	22.6	10.2	25.3	15.5	11.4	0.6	1.9
Highest 60%	9,555	94.4	46.3	12.4	15.4	12.5	5.3	2.6	0.2	4.8
Urban	7,949	93.1	21.4	14.7	10.1	12.8	4.5	1.8	0.1	6.1
Lowest 40%	1,553	73.6	56	23.5	9.7	24.8	9.7	4.9	0.3	4.7
Highest 60%	6,396	97.8	16.1	12.6	10.2	9.9	3.2	1.0	0.1	6.4
Rural	7,976	64.9	26.7	18.2	16.5	22.4	14.3	10.4	0.7	1.1
Lowest 40%	4,817	50.2	19.4	22.3	10.3	25.5	17.3	13.4	0.7	1.0
Highest 60%	3,159	87.5	11.4	12	25.9	17.6	9.7	5.9	0.5	1.3
National Capital Region	2,318	99.5	60.5	16.9	2.0	4.6	2.8	-	-	12.5
Lowest 40%	123	97.0	30.1	30.3	0.6	7.6	8.3	-	-	20.0
Highest 60%	2,194	99.7	62.2	16.1	2.1	4.5	2.5	-	-	12.1

Source: National Statistics Office, 2002 Annual Poverty Indicators Survey (APIS)

Note: "-" denotes zero count or less than 0.05 percent.

Source: <http://www.census.gov.ph/NCR/APIS/tble7.htm>

APPENDIX 3: THE QUESTIONNAIRE**THIS INFORMATION IS CONFIDENTIAL:** Number of questionnaire: |_|_|_|_|

Respondent number: |_|_|_|_|

Name respondent: _____

Purok /subdivision: _____

Visited on: _____ for the first time, on _____ the second time _____

(Household location / number on map: _____)

(if the question is not in *Italic*, the question is more of an observation)**One: Household profile data***What is your name?:* _____ Sex: _____ Age: _____*How many members does your household have?* _____

Member	Sex	Age	Occupation	Education level	Marital status

Two: Household socio-economic data1. *Could you give me an indication of the average height of your household's monthly income?* <1,000 p/m 1,000 - 4,999 p/m 5,000 - 9,999 p/m 10,000 - 14,999 p/m >15,000 p/m, namely _____2. *Do you own your house?* Yes No, owned by _____ ## *If no:* Condition of your stay: Rented
 Squatting with permission
 Squatting w/o permission3. *Do you own your lot?* Yes No, owned by _____ ## *If no:* Condition of your stay: Rented
 Squatting with permission
 Squatting w/o permission4. *Do you fear eviction?* Yes, in a period of _____ No5. *How do you dispose of your human waste?* Open gutter River/Seashore CR outside/near house with posse negro
 CR inside the house with posse negro other _____

6. Is your house accessible from a concrete road? Yes No
7. Does your house have electricity? Yes No
8. What is your monthly expense for various utility services?

	Water	Electricity	Telephone	Cable TV
Pesos				

9. What part/percentage of your monthly income do you think you use for water?
_____ %

Three: Water Supply, Access and Use

10. What is the major source of your household's drinking water?

- Well water /hand pump Well water / container Piped water Baciwa
 Piped water barangay network Purified Mineral water Other, _____

11. How much drinking water does your household approximately use per day?

- < 5 litres 5 – 9 litres 10 – 19 litres 20 – 29 litres
 > 30 litres _____

(One gallon = 3.7853 litre)

12. What is the prize you pay for the drinking water?

If you use drinking water.....

- From the BaCiWa _____ pesos a month
 From the Barangay connection _____ pesos a month
 Communal well _____ pesos per day
 Bottled water _____ pesos per day
 Do not pay anything at all, because _____
 Other, namely _____

13. What is your opinion on the quality of your current drinking water supply?

Taste: excellent very good good bad very poor
Color: excellent very good good bad very poor

14. Does your household take precautions to ensure the safety of the drinking water?

- Yes* No

* If Yes: What are these precautions? heating/boiling Filtering
 Other _____

15. Do you fear contamination from improperly use or infection caused by water?

- Yes No

16. *Have any of your household members suffered from diseases (typhoid, cholera, diarrhoea et cetera) that might have been caused by the quality of drinking water used in the last year?*

- Yes No

17. *What are the most common diseases in your family? (indicate water related)*

18. *What other sources does your household use to obtain access to water (for other purposes like washing clothes, showers etc.)?*

- | | |
|---|--|
| <input type="checkbox"/> Indoor tap BaCiWa | <input type="checkbox"/> Indoor tap barangay network |
| <input type="checkbox"/> Private Artesian well with hand pump | <input type="checkbox"/> Public Artesian well with hand pump |
| <input type="checkbox"/> Private open well with electric pump | <input type="checkbox"/> Private open well without pump |
| <input type="checkbox"/> Public open well with electric pump | <input type="checkbox"/> Public open well without pump |
| <input type="checkbox"/> Other _____ | |
-

19. *Have you ever noticed anything, or received information on water conservation?*

- Yes # No

If Yes: Where did you receive this information from?

20. *Are there any water saving measures practiced in your household?*

- Yes (question 21) No (question 22)

21. *What are these saving measures?*

22. *Have you ever experienced times of water shortages?*

- Yes # No

If Yes: In what way did you try to get access to water when the regular sources failed to provide the water?

- | | |
|--|---|
| <input type="checkbox"/> Buy water from vendor | <input type="checkbox"/> Buy water at store |
| <input type="checkbox"/> Use hand pump | <input type="checkbox"/> Other, _____ |

23. *What do you think was the cause of the water shortage?*

- | | | | |
|-------------------------------------|---|--|-------------------------------------|
| <input type="checkbox"/> Dry season | <input type="checkbox"/> Salt intrusion | <input type="checkbox"/> Failure of pump | <input type="checkbox"/> Empty well |
| <input type="checkbox"/> Leakages | <input type="checkbox"/> No pressure | <input type="checkbox"/> Other, _____ | |
-

24. *What was the usual period of time of the water shortage?*

- Minutes _____ Hours _____ Days _____ Weeks _____ Months _____

During which months did you experience a shortage of water?

This part only if connection to BACIWA, otherwise go to question 35

25. *do you have a connection to the BACIWA?*

- Yes No

26. *Does your household have an individual connection, or do you share a connection?*

- Individual share

if they share: Did you ever experience any problems with the other households? Yes _____ No

27. *How much did you have to pay for your connection?* _____ pesos

28. *Did you encounter any problems with getting a connection?*

- Yes (what kind of problem) _____ No

29. *Do you have any problems with the pressure on the tap?*

- Yes No

30. *Can you afford your monthly billing?*

- Yes No

31. *Have you ever been cut off, and why?*

- Yes, because _____ No

32. *During what time of the year is your monthly bill higher than average?*

33. *What do you think about the current water rate of your service network?*

- Too high Normal (question 35) Too low (question 35)
 Other, _____

34. *(if to high) Do you make use of other sources because of the high rates?*

- Yes No

End of part only if connection to BACIWA

35. *What is your opinion about the quality of your current water supply?*

- Excellent Very good Good Bad Very poor

36. *What aspects of your water supply need improvements for the future?*

- Water quality Pressure Reliability Service Other, _____
-

37. **Only Punta Taytay:** *If you could get a connection to the barangay service network, are you willing to pay for this connection?*

- Yes No

38. *If you could get a connection to the Baciwa service network, are you willing to pay for this connection?*

- Yes No

39. **Only Punta Taytay:** *Which of the two connections would you prefer to have and why?*

Baciwa service network, because _____

Barangay network, because _____

40. *If No, why would your household not connect to the Baciwa?*

Because, _____

Last questions

41. *Are you satisfied with your current water supply*

- Yes No

42. *Do you have any remarks concerning the water supply and water use of your household?*

Thank you for you time

End.

APPENDIX 4: RESULTS QUESTIONNAIRE USED IN THE RESEARCH

Drinking water sources								
%	Kapawa (n=20)		Masipag (n=20)		Paraiso (n=20)		All (n=60)	
Piped Water (BaCiWa)	n=0	0	n=0	0	n=0	0	n=0	0,0
Hand pump / Well water	n=6	30	n=0	0	n=10	50	n=16	26,7
Well Water from Peddler	n=10	50	n=20	100	n=7	35	n=37	88,3
Buy from one who has faucet	n=0	0	n=0	0	n=0	0	n=0	0,0
Purified bottled water	n=4	20	n=0	0	n=3	15	n=7	11,7

Drinking water sources								
%	Punta tay tay (n=60)		Magnolia (n=30)		Sawmill 2+3 (n=30)			
Piped Water (BaCiWa)	n=0	0,0	n=19	63,3	n=0	0,0		
Hand pump / Well water	n=16	26,7	n=0	0,0	n=24	80,0		
Well Water from Peddler	n=37	88,3	n=0	0,0	n=0	0,0		
Buy from one who has faucet	n=0	0,0	n=9	30,0	n=5	16,7		
Purified bottled water	n=7	11,7	n=2	6,7	n=1	3,3		
Total		100,0		100,0		100,0		

Water sources used for other domestic purposes									
	Kapawa		Masipag		Paraiso		All		
	n	%	n	%	n	%	n	%	
Piped water	6	30	0	0	0	0	6	10,0	
Private well / hand pump	1	5	7	35	10	50	18	30,0	
Public well / hand pump	2	10	10	50	9	45	21	35,0	
Buy from peddler or one with faucet	2	10	0	0	0	0	2	3,3	
Combination piped water and well / pump	2	10	1	5	0	0	3	5,0	
Combination private and public well / pump	3	30	2	10	1	5	9	15,0	
Other	1	5	0	0	0	0	1	1,7	

Water sources used for other domestic purposes						
	Punta tay tay		Magnolia		Sawmill 2+3	
	n	%	n	%	n	%
Piped water	6	10,0	17	56,7	0	0,0
Private well / hand pump	18	30,0	7	23,3	11	36,7
Public well / hand pump	21	35,0	2	6,7	17	56,7
Buy from peddler or one with faucet	2	3,3	2	6,7	0	0,0
Combination piped water and well / pump	3	5,0	2	6,7	0	0,0
Combination private and public well / pump	9	15,0	2	6,7	2	6,7
Other	1	1,7	0	0,0	0	0,0

Total number of sources used.								
	Kapawa (n=20)		Masipag (n=20)		Paraiso (n=20)		All (n=60)	
Total number of sources used		%		%		%		%
1		0		0		5		1,7
2		75		65		55		65,0
3		25		35		40		33,3

Water quality %	Kapawa		Masipag		Paraiso		Punta Taytay		Magnolia		Sawmill	
	Taste	Color	Taste	Color	Taste	Color	Taste	Color	Taste	Color	Taste	Color
Excellent	5	5	5	5	15	20	8,3	10,0	3,3	3,3	3,3	0,0
Very good	5	5	10	15	45	35	20,0	18,3	26,7	23,3	10,0	13,3
Good	90	90	75	75	40	40	68,3	68,3	53,3	60,0	76,7	70,0
Bad	0	0	10	5	0	5	3,3	3,3	16,7	10,0	10,0	16,7
Very poor	0	0	0	0	0	0	0,0	0	0	3,3	0	0

Various diseases in respondents household (water caused and not water caused)

	Kapawa	Masipag	Paraiso	Punta Taytay	Magnolia	Sawmill
diarrhoea	9	10	13		8	5
amoeba	0	3	0		3	2
flu/fever	3	8	10		18	23
other	3	9	12		13	18

Experienced shortages:

	Kapawa		Masipag		Paraiso		All		%
	n	%	n	%	n	%	n		
Experienced shortage	15	75	13	65	13	65	41	68,3	
Caused by:									
Dry season	5	33,3	3	23,1	7	53,8	15	19,5	
Empty well / overuse source			2	15,4	2	15,4	4	9,7	
No time to fetch water / no delivery of water			2	15,4	3	23,1	5	12,2	
Salt intrusion	1	6,7			1	7,7	2	4,9	
Failure of pump	4	26,7					4	9,8	
Brownout	3	20,0					3	7,3	
Don't know	2	13,3	6	46,2			8	19,6	

Experienced shortages:

	Punta tay tay		Magnolia		Sawmill 2+3		%
	n	%	n	%	n	%	
Experienced a shortage	41	68,3	23	76,7	15	50,0	
Caused by:							
Dry season	15	19,5	3	12,5			
Empty well / overuse source	4	9,7					
No time to fetch water / no delivery of water	5	12,2	1	4,2			
Salt intrusion	2	4,9					
Failure of pump	4	9,8					
Brownout	3	7,3	19	79,2			
Don't know	8	19,6	1	4,2			

Source of information

	Punta tay tay (missing)		Magnolia (n=30)		Sawmill 2+3 (n=17)		%
	n	%	n	%	n	%	
Radio			4	13,3	2	11,8	
Tv			12	40,0	4	23,5	
Barangay			2	6,7	1	5,9	
BACIWA			5	16,7	4	23,5	
Radio & Tv			3	10,0	4	23,5	
Don't know			4	13,3	2	11,8	

Quality of current water supply

	Kapawa (n=20)		Masipag (n=20)		Paraiso (n=20)		All (n=60)	
	n	%	n	%	n	%	n	%
Excelent	0	0	0	0	15	15	5,0	
Very good	5	25	25	25	25	25	18,3	
Good	65	65	65	65	40	40	56,7	
Bad	10	10	10	10	5	5	8,3	
Very poor	20	20	0	0	15	15	11,7	

Quality of current water supply

	Punta Tay Tay (n=60)	Magnolia (n=30)	Sawmill 2+3 (n=30)	
	n	%	n	%
Excelent	5,0	8,3	6,7	22,3
Very good	18,3	30,5	26,7	89,0
Good	56,7	94,2	50,0	166,7
Bad	8,3	13,8	6,7	22,3
Very poor	11,7	19,5	10,0	33,3

Improvements needed.

	Kapawa	Masipag	Paraiso	All
	n	%	n	%
Improved quality of water	15	25,0	6	20,0
Reliability of source	2	3,3	2	6,7
Improved source	1	1,7	6	20,0
Connection to BaCiWa	0	0,0	1	3,3
No improvements needed	2	3,3	5	16,7

Improvements needed.

	Punta tay tay	Magnolia	Sawmill 2+3	
	n	%	n	%
Improved quality of water	24	40,0	8	26,7
Reliability of source	4	6,6	0	0,0
Improved source	13	21,7	1	3,3
Connection to BaCiWa	6	10,0	6	20,0
No improvements needed	13	21,7	14	46,7

Access to piped sources

	Want to have a connection to barangay		Able to pay for a connection to the barangay		Want to have a connection to BaCiWa		Able to pay for a connection to BaCiWa		Prefer The BaCiWa	
	n	%	n	%	n	%	n	%	n	%
Yes	9	45	6	30	18	90	6	30	19	95
No	2	10	2	10	2	10	10	50	1	5
Maybe			4	20			4	20		
Have Connection	9	45	8	40						

Access to piped sources

	Want to have a connection to barangay		Able to pay for a connection to the barangay		Want to have a connection to BaCiWa		Able to pay for a connection to BaCiWa		Prefer The BaCiWa	
	n	%	n	%	n	%	n	%	n	%
Yes	11	55	10	50	16	80	7	35	17	85
No	8	40	5	25	4	20	8	40	3	15
Maybe			4	20			5	25		
Have Connection	1	5	1	5						

Access to piped sources

	Want to have a connection to barangay		Able to pay for a connection to the barangay		Want to have a connection to BaCiWa		Able to pay for a connection to BaCiWa		Prefer The BaCiWa	
	n	%	n	%	n	%	n	%	n	%
Yes	7	35	8	40	16	80	5	25	18	90
No	13	65	8	40	4	20	10	50	2	10
Maybe			4	20			5	25		
Have Connection										

Access to piped sources

	Want to have a connection to barangay		Able to pay for a connection to the barangay		Want to have a connection to BaCiWa		Able to pay for a connection to BaCiWa		Prefer The BaCiWa	
	n	%	n	%	n	%	n	%	n	%
Yes	27	45,0	24	40	50	83,3	18	30,0	4	90,0
No	23	38,3	15	25	10	16,7	28	46,7	6	10,0
Maybe			12	20			14	23,3		
Have Connection	10	16,7	9	15						

Why want to have connection to the baciwa / barangay

	Kapawa (n=20)		Masipag (n=20)		Paraiso (n=20)		All (n=60)	
	n	%	n	%	n	%	n	%
Better quality water / easy access	11	55	9	45	10	50	30	50,0
Safe drinkable water	7	35	7	35	6	30	20	33,3
Good service	1	5			2	10	3	5,0
Less expensive	1	5	4	20	2	10	5	8,3
No comment			2	10			2	3,3

Willing to pay for connection to the BACIWA

	Sawmill		No		Maybe		
	Yes	%	n	%	n	%	
Willing to pay for a connection to the Baciwa	26	86,7	4	13,3			
Can you afford a connection?	17	56,7	3	10,0	10		33,3

Reasons for connection:

Better quality clear good water	8	26,7
Safe drinkable water	7	23,3
Easy access	13	43,4
No comment	8	6,7

Purok Magnolia: BACIWA

	Yes		No			Yes		No	
	n	%	n	%		n	%	n	%
Have a connection to the BaCiWa	20	66,7	10	33,3	Can you afford monthly billing?	19	95	1	5
Had problems getting connection?	3	15,0	17	85,0	Ever been cut off	6	30	14	70
Ever had pressure problems	9	45,0	11	36,7	Ever illegally tapped water from baciwa	2	6,7	28	93,3
Estimated average years of having a connection = 16,45					Ever made use of other sources because of the water rates?	4	20	16	80

	To High		Normal		To low	
	n	%	n	%	n	%
Opinion on water rate	14	70	6	30	0	0

	Individual		Shared	
	n	%	n	%
Individual or shared connection	13	65	7	35

How many households you share with?

1	1	14,3
2	3	42,9
3	1	14,3
4	2	28,6

APPENDIX 5: SUCCES STORY PUROK HIDDEN PARADISE

Success story: Hidden Paradise

In the coastal barangay of Banago in Bacolod City lays a purok called Hidden Paradise. This purok is the home of a large group of former squatters. Now the squatters own the land where their houses are built on. Since the land owner wanted to evacuate the squatters from his land, they have organized into an association. This association has been a great success. Not only did they legalize their land, but they have managed to secure a safe water supply for all residents as well.

When Arcenio Acuna (landowner) and a large national concern wanted to use the land on which the squatters were living to construct new commercial building, they planned to evacuate the squatters. However, the squatters did not want to be evacuated from the land. Not without a decent compensation. The squatters organized and approached a lawyer. Eventually they were given 50 m² per family in the 1 ha relocating area. Large concrete walls have been built to separate this 1 ha of land, in which the former squatters are now living, from the 14-17 ha which is used for commercial purposes.

The 50 m² per family is not much; however the squatters were very excited that they finally were the owners of a small piece of land. They called the purok "Hidden Paradise". The association was not yet finished with their job. After legalizing the land, it was time to secure basic needs i.e. a potable water supply. At the second assembly of the association they established a potable water supply project. They found financial support for this project by an international NGO.

After receiving the loan in 2001, the association implemented the water project. A representative of the association, Dioniso S. de la Cruz, went to the local water utility, the BACIWA. Here he applied for a communal faucet. However, the BACIWA's main water line was located far from Hidden Paradise. This would mean that the additional costs of connecting to the main water line would be high. That is why the association themselves connected a 3 inch pipeline to the main water line from the BACIWA, extending to purok Hidden Paradise. Eventually the BACIWA permitted the association to connect the main water line and install the communal faucets.

The association installed three communal faucets on strategic places in the purok. Everyone can now buy potable water for only 1.50 php per container. They need to buy a chip at a tender, who for 30 percent of the profit watches over the proper use of the faucets. At least 80 percent of the total 133 households in the purok currently make use of the public faucets. Every month they flush the main lines to clean the water, and another person visits the BACIWA office to pay the bill. They still pay the bill on time, and they do not have any financial problems with the potable water supply. There are even 5 households that have a private connection to the BACIWA. Because these households make use of the extension line installed by the association, they pay approximately 1,200 php (or 100 php a month for 12 months in a row) to the association. They still save a lot of additional costs in connecting to the BACIWA. If they would have made a direct connection, it would have cost at least 10,000 php.

There are many advantages for the community now they have a connection to the potable water supply system of the BACIWA. They used to pay 2-3 php for a container of potable water they had to buy from someone who already had a faucet in a nearby purok. Now this is only 1.50 php, and they do not need to walk to another purok to collect the water. The success of the purok Hidden Paradise now functions as an example for other squatter areas that have not yet organized to improve their current situation.

How to view supplementary DVD of "Hidden Paradise" :

Option 1: For the computer – put CD in the CD-drive, open Windows Media Player, go to option *play* in the taskbar, choose for option *DVD, VCD or CD* and choose the directory in which the CD can be found. Video Track 2 is the documentary on "Hidden Paradise".

Option 2: For DVD-player – try to play the DVD as a mpeg file or choose for *Menu* , press *Play* and skip scene to video 2 (the CD has trouble loading, there is no index and you probably have to wait a few seconds (est. 35 sec) before the documentary will start playing)