

The Profile of Umalad Watershed in Roxas, Palawan

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Abstract: The access in fresh water supply in Roxas is mostly from Umalad watershed. Majority of the households' water consumption in Poblacion is supplied by the shed. This study used the descriptive qualitative method in determining water quality and quantity, watershed ecosystem, management activities, conservation and restoration, monitoring, and sustainability. The findings were the water from Umalad watershed is safe to drink; 7 plants/tree recommended for watershed are found in the area; management is concentrated on extensive annual tree planting; sustainability of the watershed depends primarily on the presence of adequate vegetation; stressors found in the area charcoal making, slash and burn activities, presence of residents and logging. It could be concluded that the Umalad watershed has quality control as to the safety of water; stressors in the area affects the sustainability of the water quantity along the minimal government intervention in the management of the watershed. It is recommended that vegetation in the area should be properly monitored and maintained; plans and strategies should be implemented effectively; legislations against charcoal making slash and burn activities and logging in the area should be strictly implemented; residents present in the area can be considered as co-managers of the watershed; analysis of the water coming from the household faucets as distributed by the Roxas Water District (RWD) is recommended.

Key words: Watershed, stressors, plans and strategies, preservation and conservation

1. Introduction

One of the most important substance on earth is water. Without it, life would never have evolved and existed. It covers more than 70% of the planet surface [1]. The human body is about two thirds water consisting the total body weight. It is also essential for almost all chemical reactions within the body.

Now, over 30% of the world's people still have limited access to it. Wastewater and flood control are major problems especially in booming Asia.

Asia water is a series of unique exhibitions that provide working solutions to these problems which is perhaps among the most important exhibition of the 21st century. According to the Kalikasan Party List Philippines, 61% of the total land areas were rivers and lakes, 90% of country's fresh water resources deemed available for human use.

Due to misuse of watershed resources, which located within the country had been degraded. This is

characterized by degraded forests, soil erosion, erratic stream flow, declining groundwater resources, loss of biodiversity, declining land productivity, sedimentation in rivers and lakes, siltation, flooding, reduced quantity and quality of water and microclimatic deterioration. These degraded watershed conditions are caused and influenced by human activities, economic and other institutional considerations [2].

Presidential Decree 198 of May 25, 1973 declared a national policy favoring local operation and control of water systems; authorizing the formation of local water district and providing for the government and administration of such districts; chartering national administration to facilitate improvement of local water utilities; granting said administration such powers as are necessary to optimize public service from water utility operations, and for other purposes.

Watershed condition [3] is the state of the physical and biological characteristics and processes within a watershed that affect the hydrologic and soil functions supporting aquatic ecosystems. Watershed condition

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reflects a range of variability from natural pristine (functioning properly) to degraded (severely altered state or impaired). Watersheds that are functioning properly have terrestrial, riparian and aquatic ecosystems that capture, store and release water, sediment, wood and nutrients within their range of natural variability for these processes. When watersheds are functioning properly, they create and sustain functional terrestrial, riparian, aquatic and wetland habitats that are capable of supporting diverse populations of native aquatic- and riparian-dependent species.

The Umalad watershed is located in the mountainous area of Umalad, Barangay IV, Roxas, Palawan and is surrounded by different trees and soil functions supporting aquatic ecosystem. This provides high biotic integrity that supports the human, animal and plant communities. Also it provides the long term soil productivity.

Many developed countries specify standards to be applied in their own country such as Europe and the United States [4]. For countries without a legislative or administrative framework for such standards, the World Health Organization publishes guidelines on the standards that should be achieved.

Where drinking water quality standards do exist, most are expressed as guidelines or targets rather than requirements, and very few water standards have any legal basis or are subject to enforcement.

Most people preferred to have an access to a quality drinking water whenever it is possible. Roxas constituents are among these people. Part of the puzzle is that how safe the water is that flows into their faucets at home, in school, in offices and other establishments, public or private.

Even though the earth contains an abundance of water, only a small percentage is fresh water. An even smaller amount of this freshwater is accessible and usable by the people and animals that need it. As the human population grows, the amount of freshwater available per person shrinks. The relatively small

amount of available freshwater demonstrates how critical it is for everyone to help maintain clean, healthy lakes and streams [5].

Philippines has a plentiful freshwater 61% of total of the country's total land area or 1,830 km² are rivers and lakes. Ninety percent (90%) of the country's freshwater resources deemed available for human use and estimated water resource potential is 226,430 million cubic meters [6].

The watershed management is a process for protecting the lakes, streams and wetlands in the watersheds from point and non-point source pollution. It is accomplished by developing an understanding of key factors that affect the water quality of lakes, streams and wetlands and by following a plan of action to prevent, reduce or minimize those activities within a watershed that may negatively impact water quality. The watershed management consists of many diverse activities including controlling point and non-point source pollution, monitoring water quality, adopting ordinances and policies, educating stakeholders, and controlling growth and development in a watershed [7].

The water conservation encompasses the policies, strategies and activities to manage fresh water as a sustainable resource to protect the water environment and to meet current and future human demand. Population, household size and growth and affluence all affect how much water is used. Factors such as climate change will increase pressures on natural water resources especially in manufacturing and agricultural irrigation [8].

Case studies conducted in four watersheds in the Philippines [9] have shown that past efforts to protect the watershed have relied extensively on assistance provided through some national forest protection programs and other community-based livelihood activities and reforestation projects. All these programs have definite time table—the watershed efforts last only as long as the program lasts. The results are short-lived watershed management initiatives.

There are stressors which are believed to have an effect on watershed such as charcoal making, slash and burn activities, presence of residents and logging. The study will also focus on these stressors as it intervenes in the Umalad watershed.

A majority of the households' water consumption in Poblacion, Roxas, Palawan are supplied by the Umalad watershed through the Roxas Water District (RWD).

However, these consumers are unaware of the profile of the watershed, the planning and strategies made by the management and the effects of some stressors present in the area. Thus, the researcher decided to conduct the study which focused on determining the profile of the Umalad watershed in Roxas, Palawan. Specifically it sought answers to the following questions:

- (1) What is the condition of the Umalad watershed in terms of (a) water quality; (b) water quantity; (c) water ecosystem condition; (d) watershed management activities?
- (2) How do the following stressors affect the watershed as perceived by the Umalad Watershed Management: (a) charcoal making; (b) slash and burn activities; (c) presence of residents; (d) logging?
- (3) What are the plans and strategies in the preservation and conservation of Umalad watershed in terms of: (a) conservation; (b) restoration; (c) monitoring; (d) sustainability?

2. Methodology and Materials

The descriptive qualitative method of research [10] was used with a researcher-structured interview guide. The respondents of the study were the Office of RWD through the general manager, Engr. Fernando Ramirez, municipal environment and natural resources officer (MENRO) Mr. Gil A. Valledor, community environment and natural resources officer (CENRO) Mr. Pedro Velasco and nine residents in the Umalad watershed area.

The Umalad watershed is located in Poblacion,

Roxas, Palawan comprising 398 ha watershed reservation as mandated by Ordinance No. 49 series 2003 authored by Hon. Elena M. Padul and Hon. Reynaldo B. Pacho.

3. Results and Discussion

The result of water quality analysis as based on Philippine National Standards for Drinking Water revealed that the water from Umalad watershed multimedia filter tank, ready for distribution, is safe to drink.

The RWD records show that there is a decline in the supply of water from the month of January to May and an increase of the same from the month of June to December, supplying about 1,747 active connections as of July 31, 2013 with the 17.47 L/s. Record estimates of RWD reveals that the Umalad watershed can distribute 1,200 m³ to 1,600 m³ a day, approximately 48,000 m³ per month and/or more or less 500,000 m³ every year.

Of the plants/trees recommended for planting in watershed areas due to its capacity to hold water, seven species are found in the area such as Bangkal, Mahogany, Ipil, Paper Tree, Pandan, Narra and Acacia.

Fig. 1 shows the result of the water quality analysis of samples taken from the Umalad Water shed as well as the result from the Philippine National Standard for Drinking Water revealing that the water from the shed as examined by the Puerto Princesa Water District is safe to drink.

There are, however, plants/trees recommended for water shed due to its capacity to hold water which are found abundant in the area (Fig. 2) such as Bangkal (*Nauclea orientalis*), Mahogany (*Swietenia mahogany*), Ifil (*Intsia bijuga*), Paper tree (*Gmelina arborea*), Narra (*Pterocarpus indicus* Willd.), Pandan (*Pandanus tectorius*), and Acacia (*Acacia confuse*).

Management activities in watershed concentrated mainly in the implementation of Ordinance No. 322, series 2007 authored by Hon. Reynaldo B. Pacho

PUERTO PRINCESA CITY WATER DISTRICT
263 Rizal Ave., Puerto Princesa City

WATER QUALITY ANALYSIS

I. DATA

Sample 1 Water sample labeled as PS-2
Lab. No. 224-05-11

Sample 2 Water sample labeled as PS-3
Lab. No. 225-05-11

Source: ROXAS WATER DISTRICT
Submitted by: M. Ramirez/ Roxas Water District
Date Collected: 5/24/2011
Date Submitted: 5/24/2011
Date Analyzed: 5/24-25/2011
Date Released: 5/25/2011

Analytical Procedure: SPECTROPHOTOMETRIC METHOD

II. RESULTS

Parameters	Sample 1	Sample 2	Maximum level*	Unit
Conductivity	160.1	406	1000	uS
Salinity	0.1	0.2	0.25	ppt
Total Dissolved Solids	76	192	500	mg/L
Color (apparent)	33	23	10	TCU
Suspended Solids	2	0		mg/L
Turbidity	3	0	5	FTU
pH	7.37	7.13	6.5-8.5	
Manganese	0.2	0.2	0.4	mg/L
Chromium	0	0	0.05	mg/L
Phosphate	0.01	0.09		mg/L
Iron	0.63	0.69	1	mg/L
Nitrate	0	0	50	mg/L
Fluoride	0.23	0	1	mg/L
Sulfate	21	25	250	mg/L
Sodium Chloride	200	200		mg/L
Chloride	120	120	250	mg/L
Alkalinity as CaCO ₃	60	180	500	mg/L
Hardness as CaCO ₃	51.3	119.7	300	mg/L
Calcium	20.52	47.88	75	mg/L
Magnesium	7.51	17.52	50	mg/L
Chlorine Residual	0.01	0.26	0.2-1.5	mg/L

*Philippine National Standards for Drinking Water, 2007ed.

Analyzed by: *ARLENE P. DOMINGUEZ*
Chemist B

Recommended Approval: *MARISSA U. MAGNO*
Water Utilities Dev't Officer A
OIC-Water Quality Unit

Approved: *JUAN A. ARQUERO JR.*
ENGR. JUAN A. ARQUERO JR.

Noted by: *ANTONIO JESUS R. ROMASANTA*
ANTONIO JESUS R. ROMASANTA

Republic of the Philippines
PUERTO PRINCESA CITY WATER DISTRICT
Engineering Service Department - Laboratory
Sta. Monica, South National Highway, Puerto Princesa City, Palawan
Tel. No. 434-5774

WATER QUALITY ANALYSIS

I. DATA

Sample 1 Sample 3 labeled as S3
Source: Roxas Water District
Lab No. S22-06-13
Date Received: 8/27/2013
Date Analyzed: 8/27/2013
Date Released: 9/2/2013

Analytical Procedure: SPECTROPHOTOMETRIC METHOD

II. RESULTS

A. Physical Test

Parameters	Sample 1	Maximum level*	Unit
Conductivity	93.1	1000	uS
Salinity	0	0.25	ppt
Total Dissolved Solids	43	500	mg/L
Color (apparent)	8	10	TCU
Suspended Solids	1	30**	mg/L
Turbidity	0	5	FTU
pH	5.7	6.5-8.5	

B. Chemical Test

PO ₄ ³⁻ Phosphate	0.05		
P Phosphorus	0.02		
P ₂ O ₅ P. Pentoxide	0.03		
Mn ²⁺ Manganese	0.1	0.4	mg/L
Cr ⁶⁺ Chromium	0.01	0.05	mg/L
Fe ⁶⁺ Iron	0.18	1	mg/L
F ⁻ Fluoride	0	1	mg/L
SO ₄ ²⁻ Sulfate	6	250	mg/L
Na ⁺ Sodium	150	200	mg/L
Cl ⁻ Chloride	90	250	mg/L
NO ₃ ⁻ Nitrate	7.5	50	mg/L
NO ₂ -N Nitrate Nitrogen	1.7		
Alkalinity as CaCO ₃	40	500	mg/L
Hardness as CaCO ₃ Calcium Carbonate	68.4	300	mg/L
Calcium	27.36	75	mg/L
Magnesium	10.01	50	mg/L

*Philippine National Standards for Drinking Water, 2007ed. **Pollution Control Department Std Class B

Note: Test results were based on sample as labeled and submitted by the client.

Analyzed by: *MOHAMAD M. MANGOTARA*
Medical Technologist

Recommended Approval: *MARISSA U. MAGNO*
Water Utilities Dev't Officer A
OIC-Water Quality Unit

Fig. 1 Water quality analysis.



Fig. 2 Trees recommended for watershed.



Fig. 3 Tree planting activity in the watershed.

establishing an extensive annual tree planting day in the Municipality of Roxas every last Saturday of June.

The tree planting activities (Fig. 3) are also one way to restore the trees that protect and hold water of Umalad watershed. In the implementation of the tree planting activity, the RWD Management is responsible for preparing the new site for the tree planting in coordination with the office of Department of Environment and Natural Resources (DENR).

Since its implementation in 2007 with an initial of 5,000 seedlings of Ipil, Mahogany and Paper Tree, and 2,000 every succeeding year, it was believed that at present there are around 12,500 of these planted trees in the area.

According to the data from DENR Roxas, approximately 83% of planted trees survived with 17% mortality.

Tree planting is said to be not sufficient to sustain the water supply in the locality especially during summer season.

Interview with the RWD Management and its board of directors (BOD) revealed that there is no existing concrete development plans for the watershed except for its usual activities and routine checking of the facilities. However, preservation and conservation of the shed depends primarily on the proper management and effective implementation of the annual tree planting in the area.

As part of the monitoring of the planted trees, a quarterly “Ring Weeding” is conducted by cleaning around new planted trees. It is a follow up to tree planting activity participated by the Non-governmental Organizations (NGOs). This is to ensure that the newly planted trees are able to thrive in the new habitat and were not outgrown by other plants. The weeding was done by hired laborers under the supervision of the RWD.

The sustainability of the watershed as revealed by the management of the RWD and the BOD depends primarily on the presence of the adequate vegetation in the area. This is the primary reason in the conduct of a yearly tree planting.

Trees and forests improve stream quality and watershed health primarily by decreasing the amount of storm water runoff and pollutants that reaches local waters; reduce storm water runoff by capturing and storing rainfall and releasing water into the atmosphere through evapotranspiration. In addition, tree roots and leaf litter create soil conditions that promote the infiltration of rainwater into the soil. This helps to replenish the groundwater supply and maintain stream flow during dry periods.

There is no existing concrete development plan for the watershed except for its usual activities and routine checking of the facilities. However, preservation and conservation of the shed depends primarily on the proper management and effective

implementation of the annual tree planting in the area. A quarterly “Ring Weeding” (Fig. 4) is conducted as part of the monitoring of the planted trees.

Plans and strategies in the Umalad watershed such as the conducting of tree planting and maintenance of the area are implemented through the RWD and its BOD and with the participation of Local Government Units (LGU), DENR, MENRO, national government organization, public and private sector particularly in its annual tree planting activity.

The RWD BOD passed Resolution No. 19-20, in 2007 requesting for the protection of the municipal watershed from illegal activities consistent with provision of Municipal Ordinance No. 49, series-2003. However, despite the efforts made by the management to preserve the area, there are stressors found to be

present in the shed.

The RWD BOD believed that there are still settlers within the declared watershed who engaged in “Kaingin” slash and burn activities every year, charcoal making, logging and quarrying along the riverbanks which affects the ecosystem of Umalad watershed, thus making the tree planting efforts of the community every year less effective.

Stressors (Fig. 5) are found in the area such as charcoal making, slash and burn activities, presence of residents and logging. Despite the benefits charcoal making and slash and burn activities have contributed to the residents, still, they affect the watershed since it takes years for a tree to be fully grown. The residents have lived in the area for decades and some claim ownership of the land. Loggings activities are conducted as a source of livelihood.



Fig. 4 The Roxas Water District (RWD) Management assigned laborers for Ring Weeding.



Fig. 5 Stressors present in the Umalad watershed.

4. Conclusions, Recommendations and Policy Implications

Based on the findings mentioned it can be concluded that the Umalad watershed, has its own quality control, thus it is safe for consumption; the quantity is enough to supply the demand for water except during dry season. Said supply is due to the presence of plants/trees recommended for watershed due to its capacity to hold water; moreover, management activities in the area are under the mandates of the law, however, a concrete development plan for the said purpose is yet to come. Despite the presence of the stressors in the area that affected the sustainability of the water quantity, and the minimal government intervention in the planning for more effective strategies for the watershed, the management of the watershed still believed the presence of adequate vegetation and the regular conducting of tree planting as the best means.

With the conclusion made by the researcher, the following recommendations are posted for consideration:

(1) Residents present in the area can be considered as co-managers of the watershed so that they will become partners in its preservation and conservation. However, the LGU may consider relocation of the residents from the watershed area.

(2) Further analysis of the water coming from the household faucets as distributed by the RWD is recommended.

(3) The management of RWD should conduct a customer satisfaction survey.

(4) Vegetation in the area should be properly monitored and maintained to ensure water sufficiency through monitoring of concern agencies.

(5) Plans and strategies for its conservation and sustainability should be implemented effectively by concerned agencies.

(6) Legislations against charcoal making, slash and burn activities and logging in the area should be

strictly implemented by concerned agencies.

(7) Further analysis of the water coming from the household faucets.

(8) The LGU should relocate the residents living in the watershed area.

With the foregoing recommendations, the study calls for a formulation of policy framework by the government agencies (local and national) in the strict monitoring of activities in the Roxas watershed, and the identification of additional water source in the locality. Policy framework should be accompanied by a local legislation or executive order to ensure the force of law.

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