WATER RESOURCE MANAGEMENT IN RURAL AREAS: A CASE STUDY IN KUCHING DISTRICT, SARAWAK, MALAYSIA

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WATER RESOURCE MANAGEMENT IN RURAL AREAS:
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A dissertation submitted
In fulfilment of the Requirement for Masters of Environmental Science
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UNIVERSITI MALAYSIA SARAWAK
2012
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<thead>
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</thead>
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<tr>
<td>AWWRF</td>
<td>American Water Works Research Foundation</td>
</tr>
<tr>
<td>BAKAS</td>
<td>Water Supply and Environmental Sanitation</td>
</tr>
<tr>
<td>CCC</td>
<td>Catchment Conservation Committee</td>
</tr>
<tr>
<td>GFWS</td>
<td>Gravity Feed Water Supply</td>
</tr>
<tr>
<td>IWRM</td>
<td>Integrated Water Resources Management</td>
</tr>
<tr>
<td>JKKK</td>
<td>Jawatankuasa Keselamatan dan Kemajuan Kampung</td>
</tr>
<tr>
<td>JKM</td>
<td>Meteorological Department Malaysia</td>
</tr>
<tr>
<td>JKNS</td>
<td>Sarawak State Health Department</td>
</tr>
<tr>
<td>JKR</td>
<td>Public Work Department</td>
</tr>
<tr>
<td>KWB</td>
<td>Kuching Water Board</td>
</tr>
<tr>
<td>LWA</td>
<td>Local Water Authority</td>
</tr>
<tr>
<td>PVC</td>
<td>Polyvinyl Chloride</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
</tr>
<tr>
<td>TWM</td>
<td>Total Water Management</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nation Educational, Scientific and Cultural Organization</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
</tbody>
</table>
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10. Encik Wilson Spilok, Assistant Administrative Officer, Siburan Sub District.
11. Abang Sulaiman Bin Abang Ibrahim, Siburan Agricultural Station
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15. Encik Harrison Sango Anak Domba, Ketua Kaum, Kampung Giam,
16. Encik Tommy Dihed Anak Dum, Ketua Kaum, Kampung Garung
17. Encik Henry Suot Anak Sawar, Ketua Kaum, Kampung Karu
18. Encik Samson Anak Manggang, Ketua Kaum, Kampung Semadang
19. Encik Kayis Anak genyai, Ketua Kaum Kampung Bengoh
20. Encik Ahip Anak Naii, Ketua Kaum, Kampung Danu
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ABSTRACT

Water covers more than 75 percent of the earth surface. About 94 percents of water is found in ocean as salt water while the rest of the water is found on the continents as fresh water. However, out of the available fresh water on the continent, 95 percent is stored as ground water or in glaciers and inland ice. Only a small fraction of the total freshwater on Earth water can be used by human. Besides being the basic element to sustain lives, it is also necessary to support the other living organism. Water cannot be created nor destroyed. The quantity remains the same within the hydrological cycles over billions of years. With increasing populations, the demand for water also increases. Water which presented itself in various forms is very unevenly distributed temporally and spatially. As rainfall is the main source of water, it is not always available in the quantity, where and where we wanted. Because of this, the water resources management is necessary to address these issues. Water resources management have to cover all aspect from source protection to ensure sustainable supplies. It will also include how water is distributed to ensure fair and equitable allocations to optimize use and prevent wastage. Water resource management is also important as a one of the ways to prevent pollution due to mismanagement of wastewater discharge. Water resource management in the rural areas is very important as most of the urban water supply sources originate from rural areas. By preventing the problem at source, water resource management in rural areas based on community based participation approach is seen as the basis for a sustainable water supply for the future.
This study explored the problems with water resources management that exist in the nine villages situated in the rural areas of Kuching District, Sarawak Malaysia. It was done by interviewing selected random samples from each village. In addition to that, other key informants were also interviewed for better understanding of the problems in the study area. The results of the interviews were analyzed using SPSS. The other information were also recorded and presented in this report.

This study had shown evidence of water depletion and deterioration of water quality in the area under study. By creating awareness, water resources will be seen not only as mere material but also as economic resources which need conservation and protection at all levels of the hydrological and hydrosocial cycle.

Taking into account of the knowledge, attitude and aspiration of the local population, water resources management in this area have a bright future to become sustainable through community participation.

Key words: Water resource management, problems, sources protection and conservation, community based and sustainable water resources management.
PENGURUSAN SUMBER AIR DI KAWASAN LUAR BANDAR KAJIAN KES DI DAERAH KUCHING, SARAWAK, MALAYSIA

ABSTRAK

Kajian ini merunkai masalah berkaitan dengan pengurusan sumber air yang wujud di Sembilan buah kampong terletak di daerah Kuching Sarawak, Malaysia. Ianya dilakukan dengan menemuduga sampel yang dipilih secara dari setiap kampung. Selain daripada itu, pemberi maklumat penting juga ditemuduga untuk mengetahui secara mendalam masalah yang wujud di kawasan kajian. Hasil daripada temubual tersebut dianalisa menggunakan program SPSS dan maklumat dari pemberi maklumat penting juga direkod dan dibentang dalam laporan ini.


Mengambil kira tahap pengetahuan, sikap dan aspirasi penduduk setempat, pengurusan sumber air di tempat ini mempunyai masa depan yang cerah untuk menjadi lastari melalui penyertaan komuniti setempat.

Kata kunci: Pengurusan sumber air, masalah air, penjagaan dan pemuliharaan sumber air berasaskan komuniti dan pengurusan sumber air secara lestari.
CHAPTER 1
INTRODUCTION

1.1 Introduction

Water is becoming one of the largest, and certainly the most universal, of problems facing mankind as the earth moves into the twenty-first century. The task of supplying enough water of the required quality to growing populations and the safe disposal of waste water are straining many authorities to the limit (Winpenny, 1994).

The problem mentioned above is definitely not an easy one to solve. Some argue that the heart of the problem lies in our perception of water. Winpenny (1994) argued the water problem that we face nowadays is our failure to see water as scarce commodities. The water problem facing us today is also partly due to the mismanagement of the finite water resource that we have taken for granted. What has been mentioned above might be happening on the global scale and involved many countries throughout the world. But, is it true that the problems above is just heard but not experienced? Is it true that what the people in the other part of the world is just a story to us or are we also facing that same problem locally? If it is true, what is the extent and what are the causes that may have contributed to the problems? However the problems above need some form of solution to minimise the impact that we face or it will escalate into much bigger problems.

There is a growing conflict in utilisation of limited water resources and environmental protection. We have to strike a bargain between protecting and conserving the environments and development by optimising water resource use through sustainable resource management. Failure to adhere to such requirement definitely will result in environmental degradation which the public involved will bear direct or indirect cost of rehabilitations.
This study will discuss the problems and intend to find out the answers to the above questions. The problems highlighted in this research will be discussed to find out some of the reasons behind the problems. The topic of this research was chosen because there are many unanswered questions in relation to water resources. These pressing issues do not only affect us but that which affected what is surrounding us. They affect us both directly and indirectly and all level of the society.

1.2 Background of study area

Kuching District in Sarawak, Malaysia has been chosen to conduct this study. Kuching is one of the districts in Sarawak. Being the capital city, it is also the administrative centre for the state. The area of Kuching District is 1862.8 square kilometres. The population of Kuching District is 681901, based on the census carried out by the Statistic Department in 2010.

![Source: Land and Survey, Sarawak (2008)]

Figure 1.1: Map showing study area
There are about 40 ethnic groups found in Sarawak. However, in Kuching itself, the major ethnic groups are the Chinese, Malays, Iban and Bidayuh. There are also some minor ethnic groups and expatriate who come to Sarawak to work. The majority of the urban dwellers are Chinese and the Malays. The Bidayuh inhabit Padawan and Siburan Sub District. However, this study does cover the whole of Kuching District. The nine Bidayuh villages chosen are situated in the Siburan and Padawan sub districts.

The Local Authority in charge of this area is Padawan Municipal Council (MPP). The council is responsible for the scavenging services and maintenance of cleanliness of the area concern. The scavenging service is important as far as water resources management is concern. Poor or no scavenging services resulted in solid waste being thrown into the river which is the source of pollution.

Figure 1.2: Upper Sarawak Kiri River – Source of raw water for KWB Treatment Plant
Table 1.1: Villages included in the study indicating headman, number of households, population and the number of samples

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of village</th>
<th>Name of Headman</th>
<th>No. of doors</th>
<th>Population</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kpg Danu, Km 51, Jln Puncak Borneo, Kuching</td>
<td>Encik Ahit Naii</td>
<td>51</td>
<td>154</td>
<td>9</td>
</tr>
<tr>
<td>2</td>
<td>Kpg Bayur, Km 45, Jln Puncak Borneo, 93250 Kuching</td>
<td>Encik Tora Jongsen</td>
<td>63</td>
<td>308</td>
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</tr>
<tr>
<td>3</td>
<td>Kpg Semadang, KM 40, Jln Puncak Borneo, 93250 Kuching</td>
<td>Encik Samson Manggang</td>
<td>84</td>
<td>519</td>
<td>15</td>
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<tr>
<td>4</td>
<td>Kampung Karu, Km 39, Jln Puncak Borneo, Kuching</td>
<td>Encik Henry Suwot Sawar</td>
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<td>822</td>
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<td>5</td>
<td>Kpg Timurang, Km 43, Jln Puncak Borneo, 932590 Kuching</td>
<td>Encik Bom Amer</td>
<td>30</td>
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<td>6</td>
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<td>Encik Tomi Dihed Dium</td>
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<tr>
<td>7</td>
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<td>9</td>
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<td></td>
<td><strong>1023</strong></td>
<td><strong>6040</strong></td>
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Basic infrastructures available include tar sealed road, Jalan Puncak Borneo which was completed in 1996. The twenty four hour electricity supply under the rural electrification scheme has also given a boost for the villages’ development. Each village has own primary schools and two government clinics to serve the nearby area. Besides that, these areas are also installed with telecommunication tower to provide cellular telephone services to the area.

Most of the villagers living in the nine villages are basically farmers and gardeners. The common crop planted being paddy. However, the trend has changed over the years.
Paddy farming is gradually changing toward planting of cash crop like pepper, banana, and rubber. Currently due to an increase of rubber prices, many tap rubber. The improved conditions of roads have enabled the local community in the area to look for jobs out of their villages. Some only come back to their villages occasionally and some choose to commute on daily basis to their place of work in the city.

Even though the number of villages chosen is small, it is very significant to this study. According to an Environmental Impact Assessment report in 1994 which was carried out by the Kuching Water Board (KWB), these villages are situated within the Sungai Sarawak Kiri water catchment reserve area which was gazetted in November, 1993. This is to protect the vital water supplying raw water for Batu Kitang Water Treatment Plant which supplies 95% of the domestic and industrial water demand for Kuching City. The area covered by the nine villages forms a proportion of the 633 square kilometres of the whole catchment area of Sarawak Kiri.

These villages have been chosen for several reasons: (1) They are located in the upper part Sarawak Kiri River which is the source of water supply in Kuching urban population (as mentioned earlier on). (2) The development activities in these areas can affect the whole of Kuching City which consume the water derived from this river. This implies that there is the need for the protection of the river and the water catchment area as a whole (3) the area for this study do not yet received any treated water supply. This means that the water supply that these villages consumed is heavily depended of streams and rivers. This make water supply very unreliable and may have adverse impact on the livelihood of the local population (4) the area have been relying on the water supply constructed on a gotong royong basis with the materials supplied by the State Health Department.
Situated in the coastal area of Sarawak, under the Koppen’s classification, the area belongs to Type “Af” which defines constantly wet tropical weather condition with temperature above 18°C. The Jabatan Kajicuaca Malaysia (JKM) divides the rainfall pattern in Sarawak into 5 types. Type I regime, which include the coastal area exhibiting one minimum (January) and maximum (June-July). The annual rainfall ranges from 4000 mm to 5000 mm.

Pan evaporation data recorded in Kuching Airport since 1963 follows a cyclical pattern within the year with the mean annual total evaporation of about 1450 mm. Mean daily temperature varies slightly within the year and the average temperature is 26.6°C. The mean relative humidity is 85.3 percent.

The nine villages chosen above depended on surface water supply from stream and rivers ever since 1970s. A lot of efforts were put to provide clean water supply to the villagers as one of the ways to control disease and upgrade the quality of lives. Government agencies like the State Health Department have taken up the task to implement water supply project to cater for the needs of the rural population. This was done in the interest of health and hygiene. This scenario has not changed much until today. These villages got their water supply from streams which are piped to the individual household by means of Polyvinyl Chloride (PVC) pipes. This system is commonly known as Gravity Feed Water Supply (GFWS) system. This is because the system depended on the gravitational force to deliver water from the higher to the lower level. Unlike the other systems, GFWS system is very dependent on the stream flows and how the local communities managed them. It is also highly dependent on the amount of rainfall. This is because the nature of impounding dam is usually shallow and does not meant to store a large volume of water for long duration. The system is more appropriate when the water source is higher than the level of the villages to
which it water is to be supplied. The two components of water and elevation need to match for GFWS system to be feasible. The water resource in the rural areas is not as complex as that in the urban area. Unlike the urban water supply, the rural water supplies do not installed meters for the services and the water usage are not charged. The maintenance of the water supply system are done by the villagers themselves under the leadership of the village headmen and assisted by the committee in charge of the water supply. There is no mechanism to levy charges on water consumed. This gives the impression that water is free of charge and in unlimited supplies.

The problem is not only confined to the use of water from the GFWS system. Like any type of water supply system, the final discharge as a result of water use also posed problem to the environment. This is because as mentioned earlier, the scope of water resource management is not only confined to the water that is abstracted for the sources which then is distributed to be consumed. The water resources management also will include aspect of what happen after water usage. This will include waste water management and sewage water treatment prior to disposal to the water bodies. This is because from observation, this problem has not been taken seriously.

1.3 The background of study

Water resources management in rural areas had been chosen as the topic for this study to explore the management of the water resources which include water supply system, water consumption pattern and the local community perception of their water resources. Rural water resources mainly confined to those that involve village which do not yet have treated water supplies from the Kuching Water Board (KWB) or Public Work Department (JKR). Water resources serving these areas have simple management based on the local setting. The villages depend on the water systems built based on local communities participation with