



RESEARCH PAPER

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Knowledge, perception and attitude towards the current status of Cagayan de Oro River, Philippines

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Abstract

Rivers and river systems played a key role in the emergence of the world's ancient civilization. Increasing knowledge, awareness and appreciation of the diverse values of the current status of CDO River, is necessary to create the willingness to undertake the behavioural changes required to conserve and sustainably use biodiversity. This study aims to determine the socio-demographic profile; assess knowledge, perception and attitude; identify problems in Cagayan de Oro River and recommend management measures. The respondents were randomly selected and the research instrument used is survey questionnaire; and both qualitative and quantitative research design were applied. The research was conducted at Brgy. Consolacion, Cagayan De Oro City. The results revealed that, out of 100 respondents, majority of them are aware of the programs conducted by the LGU's and other agencies to maintain water resources management. On the other hand, the community doesn't give any priorities to such concern, instead they focused on their livelihood for a living. In addition, the researchers concluded that, the current status of Cagayan de Oro River is no longer the same compared before. Cagayan de Oro River today is more polluted, containing lesser number of fishes, and water quality diminished over time. Hence, the researchers would like to recommend for future researches to come up with some management measures and strategies to protect water resources especially in Cagayan de Oro River.

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Introduction

Rivers and river systems played a key role in the emergence of the world’s ancient civilization such as ancient China, Mesopotamia and ancient Egypt. These early river-based civilizations were largely concentrated around large rivers because in those regions, opportunities for gathering and hunting for food were declining (Mabao *et al* 2014). In addition, rivers also provide critical supply of freshwater for many human societies and ecosystems (Gleason & Smith 2014) on which humans derive utility benefits from the environmental services of biological communities it hosts (Myers 1996). It can also be a source for irrigation and for hydroelectric power generation. The rivers and riparian zones have both aquatic and terrestrial communities which interact on well-functioning food webs fundamental for sustaining life (Naimen *et al* 2012). The Cagayan de Oro River serves as the natural boundary between the Province of Bukidnon and Iligan City and between Bukidnon and Cagayan de Oro City, based on the administrative order issued by the defunct Department of Mindanao and Sulu during the American occupation of the Philippines. In Cagayan de Oro City, it is the dividing line between its two Congressional districts (Mack, 2013).

Cagayan River, often called as Cagayan de Oro River, is one of the rivers draining the northern central part of the island of Mindanao in the Philippines. It is one of the major rivers in Mindanao having its headwaters in Kalatungan Mountain Range in the central Province of Bukidnon with 8 major rivers, within the 7 municipalities: Talakag, Baungon, Libona, and Pangantucan of Bukidnon; Iligan City of Lanao del Norte; Municipality of Bubong of Lanao del Sur, ARMM; and Cagayan de Oro City, which are composed with 122 barangays. The Cagayan de Oro River Basin has a total land area of 137, 933.77 hectares (DENR 10 2012). It was identified as one of the highly polluted river systems in Northern Mindanao; the siltation, domestic wastes and runoffs of this river were attributed to various urban and upstream practices (DENR 10 1996). From the Academe the “Safer River Life Saver Foundation,

Inc.” of Liceo de Cagayan University (LDCU) aimed to protect and enhance the ecology of the Cagayan de Oro River. SRLSFI is a community service in extension and research to maximize benefits that is derived from the river’s vast potential resources for the best interest of society, its programs include local capacity building related to health and sanitation, education, livelihood development, and skills development. The environmental programs include: solid waste orientation, clean-up drive, tree planting/tree growing, and river patrol/monitoring, coastal resource management and eco-tourism. The River Basin Organization (RBO) is responsible for the crafting of River Management Master Plans that will be endorsed by the River Development Council and RBCO for National budget appropriations of the DENR. The agency has also designated the river basin as a “water quality management area” or WQMA (DENR Administrative Order No. 2013-18) (Relox *et al* 2016).

Given the facts that, the government has been conducting series of environmental programs concerning the status of Cagayan de Oro River, we the researchers, have been interested to conduct a survey pertaining to the Knowledge, Perception and Attitude of the community living along the riparian area. Despite of the government’s efforts in implementing environmental laws and policies, we observed that there were still environmental gaps that hinders the program to maintain the quality of the river. Hence, the researchers aims to determine the socio-demographic profile; assess knowledge, perception and attitude of the residents; identify problems in Cagayan de Oro River and recommend management measures.

Conceptual Framework

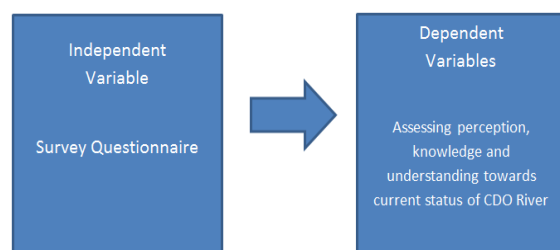


Fig. 1. Schematic diagram of the study.

To give a clearer view of the direction of the study, this study will utilize the dependent and independent variables in which the dependent pertains to the assessment of the knowledge, perception and attitude of the respondents towards the current status of CDO River and the independent variable focused on the use of survey questionnaire.

Materials and methods

Study Area

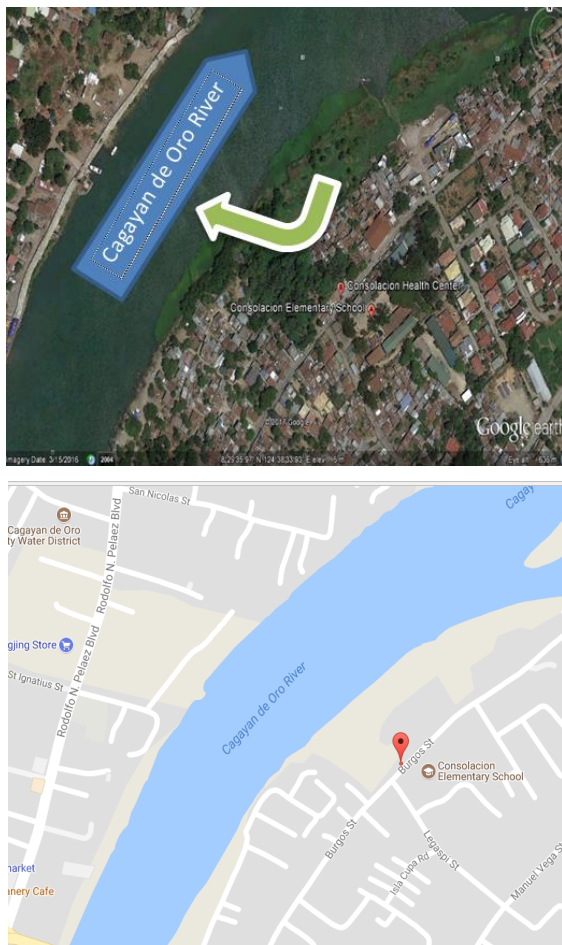


Fig. 2. Map of Cagayan de Oro River.

In order to explore the array of alternatives the researchers have set out to investigate the current status of Cagayan de Oro River. The researchers made use of secondary data to provide additional fundamental information. The study made use of the qualitative and quantitative research design. Qualitative design in this research is use to describe and explain the different models and theories pertaining to the knowledge, perception and attitude towards the current status of Cagayan de Oro River,

while quantitative design is use to examine, analyse, and interpret the results. The study was conducted in Cagayan de Oro City. Exact location is in Brgy. Consolacion, which is the downstream area of Cagayan de Oro River. There are 100 respondents of this study. These respondents are randomly selected. They are the residents living near the downstream area of the river. The researchers used survey questionnaire in gathering data and information from the respondents about their knowledge, perception and attitudes towards the current status of Cagayan de Oro River.

Results and discussions

Socio-Demographic Profile

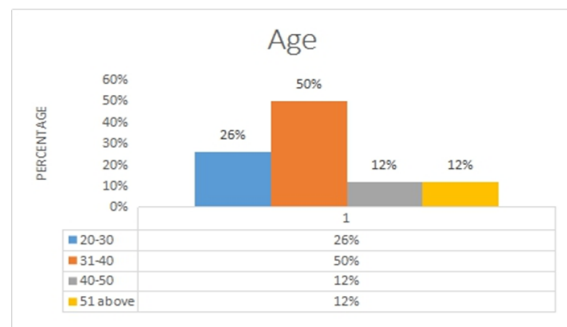


Fig. 3. Graph for age.

The table shows that age ranging from 31-40 got the highest percentage of 50%; both 40-50 and 51 above got 12%. This only signifies that there will be an increase of population for the next years to come. Higher population means it will contribute to a higher rate of pollution in Cagayan de Oro River Bank.

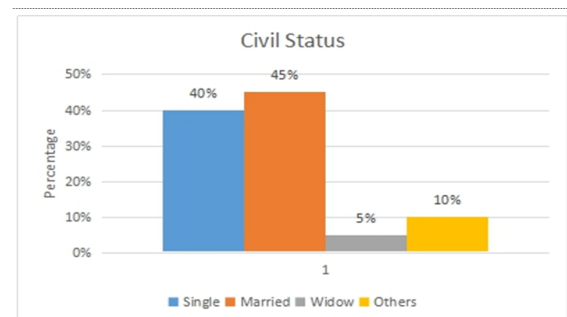


Fig. 4. Graph for the civil status.

Fig. 4 shows that 45% of the respondents were married individuals as being the highest in rank and only 5% of them were widows as being the lowest.

It signifies that there are greater impacts of pollutants on the river due to higher population.

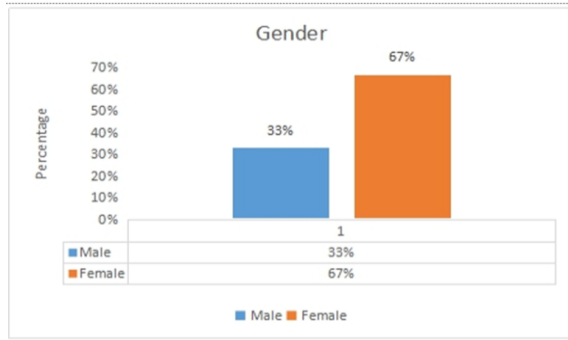


Fig. 5. Graph for gender.

Fig. 5 shows that 67% of the respondents were female individuals as being the highest in rank and 33% of them were males as being the lowest. It implies that women contribute higher possibility of polluting CDO River due to various household tasks such as laundry and washing dishes including defecation along river banks and increased production of waste materials.

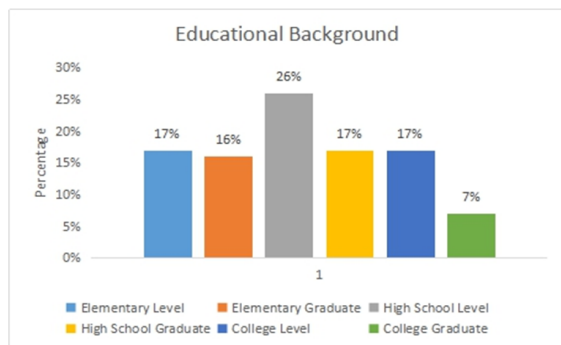


Fig. 6. Graph for the educational background.

Fig. 6 shows that 26% of the respondents were high school level as being the highest in rank and 7% of them were college graduates, which means only few of them have the knowledge of preserving as well as conserving the river resources.

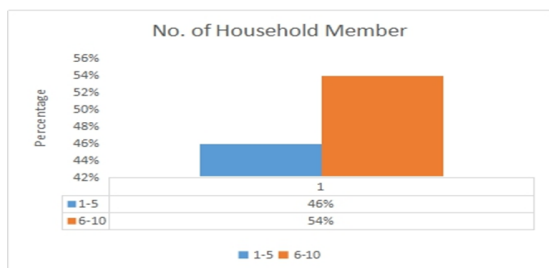


Fig. 7. Graph for the no. of household member.

Fig. 7 shows that 46% of the respondents have at least 1 to 5 members in their household while 54% have at least 6 to 10 members. This implies that higher population means it will contribute to a higher rate of pollution in CDO River.

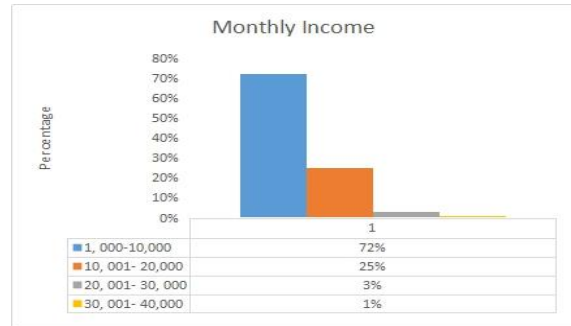


Fig. 8. Graph for the monthly income.

Fig. 8 shows that majority of the earners got 72% with 1,000 - 10,000 and 1% of which earns 30,001 - 40,000 of the respondents. This indicates that most of the people living along the river banks are mostly construction workers due to its level of educational attainment as well as the demands of workers in an industrialized city.

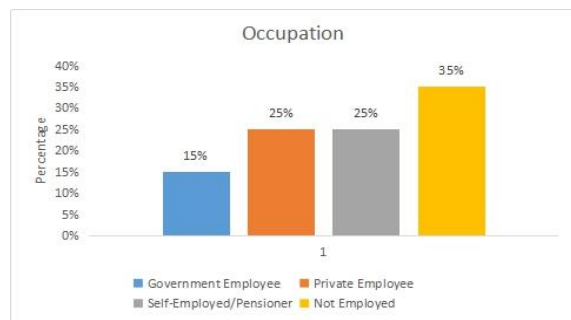


Fig. 9. Graph for the occupation.

Fig. 9 shows that 35% of the respondents were not employed as being the highest in rank and 15% of them were government employees.

It indicates that with low educational attainment, it follows that there will be higher rate of unemployed individuals. So, if there are many unemployed individuals, there will be greater possibility that they can contribute higher amount of wastes at home polluting thereby the river bank. Therefore, there are more contributors of pollutants.

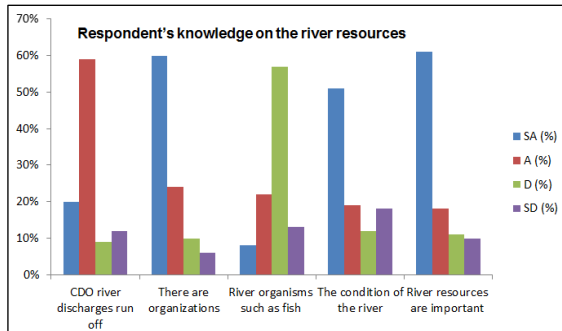


Fig. 10. Graph for Respondent's knowledge on the river resources.

Fig. 10 shows the respondent's knowledge on the river resources with 59% who agreed on the first statement that Cagayan de Oro River discharges runoff from various activities upstream including the estuary and coastal areas. More so, only 9% of them disagreed which means that the respondents are aware that the source of numerous activities that can contribute water pollution on the river are in the upstream areas. Furthermore, for statement number two, 60% of the respondent's strongly agreed and 6% strongly disagreed on the statement that there are organizations and government agencies in the barangay with environmental program concerning the status of the river. This indicates that the people living near the riparian area are keen observers about the different environmental programs that the government implemented for the protection of the river. More so, for statement number three, 57% disagreed on the statement that river organisms such as fishes and others are still plenty in the river, 8% strongly agreed which means that there are only few aquatic organisms present. In one of the interviews conducted by the researchers, one of the respondents said that years ago, they were able to catch more fishes in the river but nowadays seldom you can find them. Perhaps, the reason, according to them is that, fishes can no longer survive because of pollution. According to the DENR Region 10 (1996), Cagayan De Oro River is one of the highly polluted river systems in Northern Mindanao hence, this conforms to the study of Austin B. 1998, that when large quantities of pollutants are released there may be an immediate impact as measured by large-scale sudden mortalities of aquatic organisms, e.g. fish kills

resulting from contamination of waterways with agricultural pesticides. In statement number 4, there were 51 respondents who strongly agreed that the condition of the river and its resources are much better in the past years than today and only 12 disagreed. With the high percentage of the respondents who strongly agreed with the statement, it only signifies that they are conscious on the river resources. For statement number 5, 61% strongly agreed and 10% strongly disagreed on the statement that the river resources are important to humans. The respondents are knowledgeable on how important the river is to humankind since it could be a source of food.

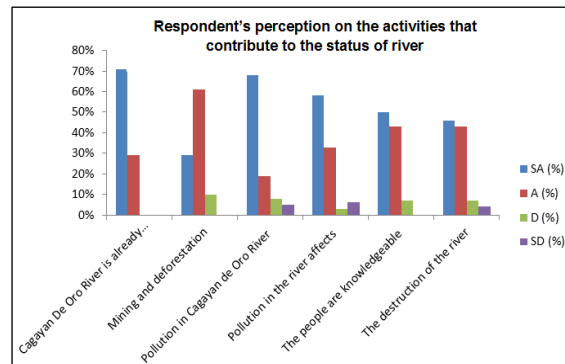


Fig. 11. Graph for Respondent's perception on the activities that contribute to the status of river.

Fig. 11 shows the respondent's perception on the activities that contribute to the status of the river revealed that for statement number 1, 71% strongly agreed while 29% agreed on the statement that Cagayan De Oro River is already polluted. Accordingly, their perception is based on the sources of information coming from media, which only means that at present, the people living near the riparian area of Cagayan De Oro River are aware that the river is polluted. For statement number 2, 61% of the respondents agreed and 0% strongly disagreed on the statement that mining and deforestation is the major contributor of sedimentation in the river. Although, the educational attainment of most respondents is only high school level, they are still aware on the activities that contribute to the status of the river because of media. In addition, statement number 3 revealed that, 68% of the respondents strongly agreed while 5% strongly disagreed on the statement that

pollution in Cagayan de Oro River greatly affects the nearby and riparian communities. It depicts that the respondents who belongs to the riparian communities are mindful of the effects of pollution from the river. Statement number 4 states that, pollution in the river affects the abundance of organisms in the river and coastal areas, 58% strongly agreed and 3% disagreed.

Based on these results, the respondents are knowledgeable that pollution has a negative impact to the aquatic organisms living in the river and in the coastal areas. They already said in an interview conducted by the researchers that, pollution is one of the reasons why fishes in the river are no longer plenty. Moreover, in statement 5, 50% of the respondents strongly agreed while 0% strongly disagreed on the statement that the people are knowledgeable about the activities and different organizations working in their barangay, which concerns the welfare of the river which only means that, the people living in the area are vigilant about the different activities and organizations working hand in hand for the benefit of the river.

For statement number 6, which talks about the destruction of the river ecosystem as a government concern, 46% of them strongly agreed and 4% strongly disagreed. The result of this statement is quite alarming because it shows that the respondents are so much dependent with the government. However, based also on the result in Fig. 15, the respondents are willing to participate in water resource management.

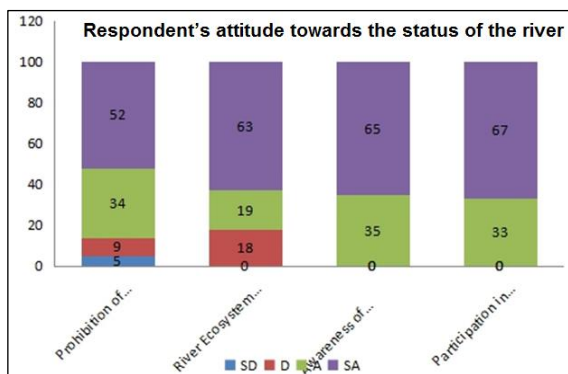


Fig. 12. Graph for respondent's attitude towards the status of the river.

Fig. 12 shows the respondent's attitude towards the status of the river revealed that in the prohibition of mining and deforestation, there were 52 respondents who strongly agreed and only 5 strongly disagreed.

In river ecosystem protection, among 100 respondents, there were 63 who strongly agreed and none strongly disagreed. Furthermore, awareness or river resources revealed that 65 respondents strongly agreed and none strongly disagreed.

Lastly, participation in management programs, there were 67 respondents who strongly agreed and none strongly disagreed. Based on the results articulated above, most of the respondents showed positive response towards the status of the river.

Hence, it indicates that the community are most likely to participate in different environmental programs conducted by LGUs and other agencies for the management of CDO River.

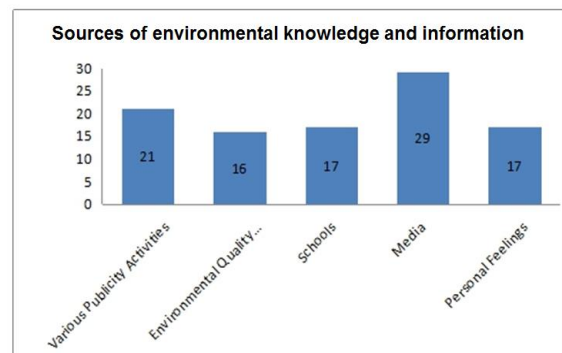


Fig. 13. Graph for sources of environmental knowledge and information.

Fig. 13 shows the sources of environmental knowledge and information revealed that out of 100 respondents, 29 of them were coming from media sources. On the other hand, only 16 respondents acquired knowledge through environmental quality communiqués.

The results indicate that media is the most accessible source of environmental knowledge provided that almost all members of the community have televisions and radios that can be utilized.

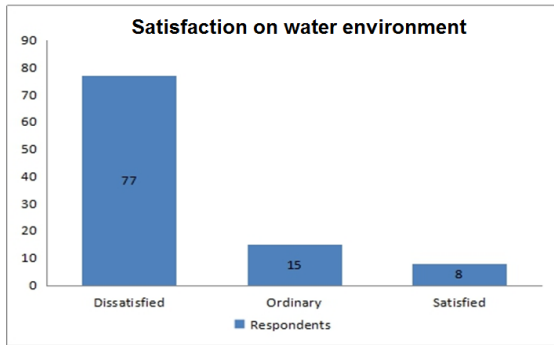


Fig. 14. Graph for the satisfaction on water environment.

Fig. 14 shows the satisfaction on water environment revealed that among 100 respondents, there were 77 who were dissatisfied, and only 8 were satisfied. Thus, it implies that CDO River is no longer the same compared years ago; it is already polluted and containing lesser number of fishes. In addition, the water quality of the river diminished over time.

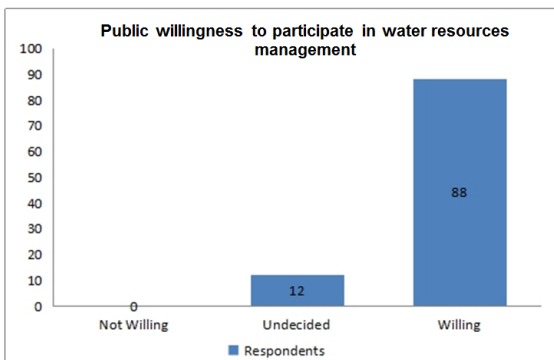


Fig. 15. Graph for public willingness to participate in water resources management.

Fig. 15 shows the public willingness to participate in water resources management revealed that among 100 respondents, there were 88 respondents who are willing, and none for not willing. The results indicate that the community are still willing to participate in the implementation of environmental laws and policies to further protect and conserve water resources and acquire skills in managing these resources for future use.

Conclusion

Based from the results, the researchers found out that, in Fig. 10: Respondents knowledge on River

Resources revealed that, among 100 respondents, 59 who strongly agreed that there were runoff discharges that happened and 60 who strongly agreed that there were environmental programs implemented sponsored by government agencies concerning River resources. Also, there were 57 respondents who disagreed that there were still plenty of aquatic organisms such as fishes that inhabit in CDO River. In addition, there were 51 respondents who strongly agreed that the river and its resources are much better in the past years than today. Lastly, there were 61 respondents who strongly agreed that the river resources are important to humans, hence, they are all aware of the significance of the river resources but those facts were never be their immediate concern since, they were more focused on survival. Therefore, the current issues on environmental aspect will be given less priority. In Fig. 11: The Respondents' perception on the activities that contribute to the status of river represented that they were more aware that CDO river was indeed polluted due to some environmental factors such as mining and deforestation as the major contributors of sedimentation that were happened at the upstream area. Hence, the effects of these activities will be a great contributor to affect the abundance of aquatic organisms. Furthermore, they were also aware of the activities conducted by the different organizations concerning environmental issues. They also agreed that the distraction of river ecosystem is a government concern. In Fig. 12: The Respondent's Attitude towards the status of the River. The respondents were all positive to really prohibit the mining activities upstream that may affect the quality of the river and to all aquatic organisms. Also, they agreed that, there must be protected areas for river ecosystems to sustain and preserve these resources. In addition, they also believed that awareness on the importance of the river ecosystems will be put into practice. Furthermore, they all agreed that there must be strong participation of residence in conservation programs from LGUs. In Fig. 13: Sources of environmental knowledge and information. The results showed that, most of the respondents acquired their knowledge on environmental issues were

coming from the media. In Fig. 14. Satisfaction on water environment. The people were dissatisfied on the status of CDO River in terms of water quality and food abundance. Lastly, in Fig. 15: Public willingness to participate in water resources management. The result shown, those residents were more than willing to participate in water resources management.

Recommendation

The researchers would like to recommend for future researches to come up with some management measures and strategies to protect water resources especially in Cagayan de Oro River.

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