

CHAPTER IV - GOVERNANCE STRUCTURE

This chapter has two important parts. First, this chapter discusses the experience of Region X Philippines during the 2011 Typhoon Washi; and second, this chapter explores the country's disaster management governance structure and its implications for the performance of the disaster management network of Region X Philippines.

4.1 Region X, Philippines in the face of Typhoon Washi

It was on December 16 and 17, 2011 when tropical storm (TS) Sendong (international name "Washi") struck Northern Mindanao. The typhoon brought massive destruction of property and even loss of many lives. According to the final report of the NDRRMC, a total of 131,618 families/698,882 persons were affected by the tropical storm Sendong in 866 barangays of 60 municipalities and nine cities in the 13 provinces of Regions VI, VII, IX, X, XI, CARAGA, and ARMM. However, it was stated that Region X suffered the most which, on the other hand, affirmed that Iligan City along with Cagayan de Oro City experienced enormous infrastructure damage and loss of lives, among others (NDRRMC, 2012).

From midnight of December 16 until dawn of December 17, 2011, TS Sendong hit Region X. The Region experienced heavy rains which led to flashfloods in the flood-prone areas and landslides in the mountainous areas of both Cagayan de Oro and Iligan City. Based on the NDRRMC report, in 2011, TS Sendong was considered to be the most disruptive cyclone with the number of dead reaching 1,268 (NDRRMC, 2012). Hence, in Iligan City alone there are 666 persons who died and 224 of whom were unidentified; 566 persons were missing; and 4,511 individuals were injured. There were 22,522 families who were affected while there were 1,800 families inside the evacuation centers (RDC X, 2012).

In an interview with the former DRRM Officer of Iligan City, Mr. Bendijo, narrated how the events unfolded in the first days of TS Washi. Accordingly, there were preparedness and response measures in place prior to the coming of Typhoon Washi on December 2011. “With the initial forecast from the PAGASA that Iligan might experience heavy rains brought about by TS Washi, the Local Chief Executive, Mayor Lluch, initiated several meetings finalizing the preparations and immediate response mechanism that the City might need” Bendijo narrated.

The focus of both Cagayan de Oro and Iligan City disaster management team was in the most flooded areas in the City. In Iligan City, the first responders were in Barangay Tubod as the river was rapidly rising. However, at 10:00 o’clock in the evening, an information was received that the Mandulog river was also rising and bolts of logs were rolling. *“People then started to panic and at 11pm, the Mandulog Bridge broke which cause flashfloods in the Barangay Hinaplanon and Bayug Island. Upon knowing that the Mandulog Bridge broke, the response team was stranded in Barangay Tubod. The water was already high, and it was very risky for the responders to cross the river. Hence, we did not take the risk.”* The Barangay Response Teams were the one who went and acted on the needs of the community affected by the flashflood. At 12midnight (December 17), the flood decreased and the casualties both human and property were heartbreakingly apparent. At 3am, after we gathered and agreed the strategy and priority for rescue, we started to look for survivors and we gathered the dead. The responders were exhausted and tried their best to rescue the survivors who were either injured or trapped.

Morning, December 17. The response teams from Linamon and Kauswagan, Lanao del Norte came to our aid. The DRRM Council was not able to convene immediately until January of 2012 because the members themselves were affected by the flood and had to tend to the needs of their family members. However, the DRRM

Office, Executive Council and action officers as well as the PNP were able to convene and respond right away. Also, the victims of TS Washi were evacuated and gathered in covered courts of every barangay, schools, and churches.

Similar observations were gathered in the case of Cagayan de Oro. According to Atty. Soriano, CWGG convenor and chairman of the Philippine Red Cross-Misamis Oriental, “the Cagayan de Oro City Hall failed to fully mobilize its manpower during the typhoon, which was among the measures that should have been done.” He said the city’s top officials should have pushed for early cancellation of classes in schools, close the City Hall to mobilize all employees and should have gotten all village chiefs in the same page in preparation for the response efforts. Soriano said in his assessment that the City Government is effective but lacks in mobility and added that there was a lack of information dissemination that time. Soriano added that cooperation and teamwork from the people is also needed in times of disaster.

Despite the lack of sufficient resources, the local government units tried their best to provide the basic needs of the victims especially those who were in the hinterlands. Fortunately, the Regional agencies were able to augment the needs of both Cities. Also, there were assistance and resources from different organizations such as religious and non-government institutions.

4.1.1 Non-Government Organizations

Region X received huge amount of donations from individuals, religious and local and international non-government organizations, as well as from other government units. Donations came in the forms of cash, kind, and services through voluntary works.

Ms. Sais, the City Social and Welfare Development Office of Cagayan de Oro, recalled that “the biggest challenge for us during that time was the absence of coordination between the NGOs and LGU. As the lead agency on response at least in the city level, we expected that at least all disaster related activities are coordinated in the DRRM Office, so we could harmonize the response and rehabilitation efforts. However, it wasn’t the case. Some organizations were political in nature and others implemented their respective projects the way they wanted to.” Apparently, it caused problems on the part of the City Government. Iligan City share similar experience with Cagayan de Oro. According to Ms. Mantos, the City Social and Welfare Development Office of Iligan City, “we were lost during disaster response. We did not have enough resources to mobilize and NGOs were handling the evacuation centers on their own. It was very chaotic and messy.” Ms. Mantos added that they are glad about the help they have received yet it would have been better if those intentions to help were coordinated with their offices, so they could have assisted in camp management.

Moreover, the representative of the Iligan City Catholic Church and Cagayan de Oro based NGO have comparable statements. According to Mr. Apaon, Iligan City Catholic Church, “we were forced to welcome typhoon survivors in the Churches because they have nowhere to go. We tried to ask for help from the government and yet, everyone was occupied addressing various concerns. Hence, despite our hesitation, we tried our best to serve as evacuation center for the victims. Fortunately, many of our parishioners and partners extended their time and resources to help us.” Meanwhile, Mr. Borja, of Group Foundation, explained that “as an organization, our focus is on agriculture. However, during Sendong, our partner organizations sent donations to our office. So, we called the City Government Offices to hand-in the donations we receive as we do not have enough manpower to handle them and no experience in managing post-disaster conditions in the community,

but nobody was willing to accept the donations. So, we distributed it ourselves together with our partners.”

This statement is supported by the report of Balay Mindanao foundation where they mobilized their own resources together with their partners from different organizations and continue the disaster response operations in the affected communities in the Region.

“As of today, we have already distributed the food packages to 895 families (or 4,475 individuals) and hygiene sets to 570 families (or 2,850 individuals) or a total of 1,465 families or 7,325 individuals. The school supplies kits were distributed to 2,046 students. Making our task lighter and more meaningful was the presence of at least 200 coming from the Tagoloan Community College, Aid to Life Ministries, On-the-Job Trainees of KPMFI, SMI interns, PARFUND staff, broiler boys from Gingoog and Claveria, Opol Children Football Club, Ateneo de Davao students, 4th Infantry Division of the AFP, the Sarangani and GenSan Medical Team, Nagdilaab Foundation and Balay Mindanaw families and friends. Our immediate plan: We will continue responding to the food and non-food needs of our colleagues and partner/clients, the survivors in the five barangays, the residents of the three tent communities, and others who may need our help. We intend to do this by regularly assessing the needs so that appropriate and timely responses are given. Thus, we will also continue accepting cash and non-cash donations. We will install storage facilities for goods and other non-cash donations. We will be utilizing the cash donations to purchase needed food and/or non-food items that are not available in our inventory, and to support our continuing disaster response activities such as psychosocial and other forms of support to the survivors.”

Generally, this finding suggests that in 2011 Typhoon Washi, government agencies and non-government organizations were working independently in responding to the needs of the community. The lack of sufficient manpower of the government agencies to lead the entire disaster response in the city stirred the different organizations and groups in the region to act voluntarily to address the needs of the affected communities. In the statement of the Cagayan de Oro DRRM Head, Mr. Porcadilla, “after TS Washi, I can say that the CSOs and NGOs in Iligan became very active and engaging. Some of them are active partners of the

DRRM Office in the implementation of projects for the different communities.”

4.1.2 The role of women in disaster response

The final report of the Office of the Civil Defense on the Tropical Storm Sendong Post-Disaster Needs Assessment elaborated the impacts of Typhoon Washi to the vulnerable sectors in the Region as well as the roles played by women in disaster response.

Women and children, as well as the elderly are the ones who are the most affected in times of calamity or disaster. Not only are women exposed to risks, but they are the most preoccupied with the productive and reproductive needs of their families during the crisis. While women are trying to cope as victims of the disaster, they are also obliged to perform their duties in their households or in the evacuation centers serving their families and other displaced members of their community.

Generally, women are first to be mobilized in activities such as relief distribution and in the creation of committees inside the transitional shelters. Seventy percent of men helped in the rescue operations, while women attended to their usual roles of taking care of children, and other vulnerable members in the family. In Iligan, more men died than women although, on the overall, slightly more women perished in the disaster than men. Particular attention needs to be given to the situation of single-parent or widow-headed households as a result of the disaster. While continuing to carry out regular household chores, women who have lost their spouses or partners now face the multi-burden of child-care and looking for livelihood.

There was no clear data on number of orphans and nutrition status of children in evacuation camps. It was estimated though that

90% of affected children were not having their age-related medical and nutritional needs addressed even before the disaster. In the focused group discussion (FGD) conducted in Iligan, three documented cases of sexual abuse of girls were noted: two cases in Santiago, and one in Sta. Filomena. One of the victims was already referred to a crisis center that at least provides a safe space away from the perpetrator. Civilian safety and protection is among the concerns raised in the FGDs.

Police visibility is insufficient, a fact even the police officers themselves recognize. There has been a 5 percent increase in petty crimes, probably more since many such crimes go unreported. Human trafficking is also reported to have increased by 10 percent after TS Sendong. The prevalence of gender-based violence and uncontrolled drinking and other vices among men inside the evacuation camps were also reported. Some outsiders or non-victims have gained entry and occupied spaces in the ECs/TCs which is resented by the IDPs. This is blamed for the increased incidence of crime and violence in the evacuation and transitional shelter areas. It was estimated that 80 percent of the most vulnerable groups that include persons with disabilities, pregnant, and the elderly were not given special attention. There was not also enough protection and debriefing for response and rescue workers and volunteers. Majority of the victims and survivors belong to the informal sector and were dependent on underground economy for their livelihood. Many complained about losing their only means of living (i.e., tricycles, balut making materials, sewing machines, and others). IDPs cite the lack of capital and the need for cash to meet daily needs as their priority.

However, some enterprising women IDPs make use of plastic materials from garbage which they are now utilizing as raw materials for making wallets, bags, and other items that they can sell in the informal market. Others resort to “sarisari” retailing in the evacuation

and transitional camps. At present, NGOs and LGUs are assisting survivors in their early economic recovery but the assistance is sporadic and lacks sustainability. Assistance from funding facilities like cooperatives, DSWD's SEAK, Holcim's brick making/mason work, Save the Children's Cash-for-Work have been cited as very helpful.

In summary played a significant role in disaster response during the 2011 Typhoon Washi in Region X, Philippines. Women and children were found to be part of the most vulnerable sector in the society especially during disasters, yet they are found to be more resilient too. The role played by women in evacuation sites and transitional shelters were meaningful in the entire disaster response and rehabilitation. Despite being victims themselves, women assisted the different government and non-government organizations who extended assistance in their communities. According to the representative of the Catholic Church, "we feel very fortunate that we have many parishioners who came to the Church and helped in managing the needs of the evacuees. Most of our parishioners who extended their services to the church are the women who practically managed the needs of the victims. Eventually, women among the victims also volunteered helped in preparing the meals for everyone."

Therefore, the innate characteristics of women particularly mothers enabled them to perform their duties in their households or in the evacuation centers serving their families and other displaced members of their community, while at the same time coping to the impacts of disasters as they are victims too.

4.2. The Philippine disaster management network structure: Too good to be true?

Introduction

Jatmiko and Tandiarrang (2014) on their study of the Indonesian Maritime Agency found that the existing structure of the agency does not support better communication among agencies which are crucial towards the Agency's performance. Meanwhile, Chang-Seng (2013) argued that the polycentric structure of the Indonesian disaster management is ideal in responding to the cases of the tsunami in the country however, it is not suitable to the norms of Indonesian political community. Moreover, Nurmandi et al., (2015) studied the different disasters in Indonesia and concluded that different governance structures are formed in each of the disasters they studied.

This study uses the mixed-method approaches to Social Network Analysis in evaluating the network structure of the Philippine disaster management and its implications for disaster governance. Social network analysis (SNA) which provided the overview of the network's topology in terms of its density, diameter, and average distance metrics, and network's centrality in terms of degree, betweenness, and closeness centrality metrics determined which organization/agency holds the central role within a network.

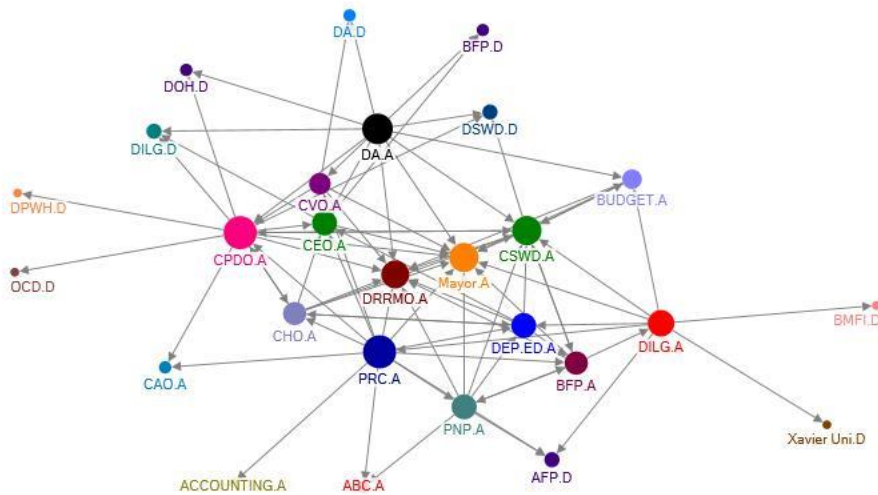
This chapter presents the structural analysis of the Philippine disaster management network of the Regional and Local disaster networks. This chapter is divided into eight parts. The first part discusses the introduction which includes the research methodology utilized in this part of the study. The second, third, fourth and fifth parts present the findings for Iligan and Cagayan de Oro Cities, Province of Misamis Oriental and Region X, respectively. The sixth part presents the summary of all the networks, the seventh part

presents the discussion and the last part shows the conclusion and limitations of this structural analysis.

4.2.1 Governance Structure in the Iligan City DRRM network

Table 4.1. The topographic metrics of the Iligan DRRM network.

Metrics	Formal Authority Network
Node Count - Edges	27 - 71
Density	0.2193 > 0.2022 (high)
Diameter	4
Average Distance	2.003



Created with NodeXL Pro (<http://nodexl.codeplex.com>) from the Social Media Research Foundation (<http://www.smrfoundation.org>)

Figure 4.1. The Iligan City DRRM Network Structure

Table 4.2. The centralization scores for the Iligan DRRM network

Metrics	Iligan City DRRM network
Degree	5.704
Betweenness	14.037
Closeness	0.019
Eigenvector	0.039

Table 4.3. Centrality scores of the Iligan DRRM Network Members

ILIGAN CITY									
Degree	In	Out	Betweenness Centrality		Closeness Centrality		Eigenvector Centrality		
1. CPDO.A	14	5	11	CPDO.A	84.355	PRC.A	0.026	PRC.A	0.076
2. PRC.A	14	1	13	PRC.A	82.701	CPDO.A	0.025	Mayor.A	0.074
3. <u>DA.A</u>	12	0	12	DILG.A	54.058	Mayor.A	0.024	CSWD.A	0.072
4. CSWD.A	11	8	6	<u>DA.A</u>	42.192	CSWD.A	0.024	CPDO.A	0.071
5. Mayor.A	11	11	0	CSWD.A	26.220	DRRMO.A	0.023	DRRMO.A	0.069
6. DRRMO.A	10	10	0	Mayor.A	24.685	<u>DA.A</u>	0.022	<u>DA.A</u>	0.060
7. DILG.A	9	1	8	CEO.A	19.553	CEO.A	0.022	<u>DEP.ED.A</u>	0.057
8. CEO.A	8	5	3	DRRMO.A	12.911	CHO.A	0.021	CHO.A	0.056
9. <u>DEP.ED.A</u>	8	2	7	CVO.A	10.938	<u>DEP.ED.A</u>	0.021	BFP.A	0.053
10. PNP.A	8	4	5	PNP.A	7.985	CVO.A	0.021	PNP.A	0.052
11. BFP.A	7	4	5	<u>DEP.ED.A</u>	5.933	DILG.A	0.020	CEO.A	0.051
12. CHO.A	7	3	6	Budget. A	3.735	BFP.A	0.020	DILG.A	0.048
13. CVO.A	6	2	4	CHO.A	1.629	Budget. A	0.019	CVO.A	0.043
14. BUDGET.A	5	3	3	BFP.A	1.604	PNP.A	0.019	Budget. A	0.039
15. AFP.D	3	3	0	AFP.D	0.500	DSWD.D	0.019	DSWD.D	0.024
16. DILG.D	3	3	0	DSWD.D	0.000	CAO.A	0.018	DILG.D	0.022
17. DSWD.D	3	3	0	DILG.D	0.000	AFP.D	0.018	AFP.D	0.021
18. ABC.A	2	2	0	DOH.D	0.000	DILG.D	0.017	CAO.A	0.018
19. BFP.D	2	2	0	DPWH.D	0.000	DOH.D	0.016	DOH.D	0.016
20. CAO.A	2	2	0	OCD.D	0.000	ABC.A	0.016	ABC.A	0.015
21. <u>DA.D</u>	2	2	0	CAO.A	0.000	BFP.D	0.016	BFP.D	0.013
22. DOH.D	2	2	0	ABC.A	0.000	Accounting.A	0.016	<u>DA.D</u>	0.012
23. Accounting. A	1	1	0	BFP.D	0.000	DPWH.D	0.015	Accounting.A	0.009
24. BMFLD	1	1	0	<u>DA.D</u>	0.000	OCD.D	0.015	DPWH.D	0.008
25. DPWH.D	1	1	0	Accounting. A	0.000	<u>DA.D</u>	0.015	OCD.D	0.008
26. OCD.D	1	1	0	Xavier Uni.D	0.000	Xavier Uni.D	0.014	Xavier Uni.D	0.006
27. Xavier Uni.D	1	1	0	BMFLD	0.000	BMFLD	0.014	BMFLD	0.006

As shown in Table 4.1, the density of the Iligan City DRRM network is 0.219, which imply that the network has relatively a number connection. Also, the network’s diameter is 4 and the average distance is 2.003 which suggest that the network can be considered centralized as the longest distance between nodes is four steps away. This finding contrasts the structure in Figure 4.1 which shows no single organization dominates the network and the transactions in the network is evenly distributed. The structure indicates that there is a low centralization in the network. Thus, information sharing and coordination in the Iligan City DRRM network can be relatively faster and effective.

Moreover, Table 4.3 shows the centrality scores of the member-agencies of the Iligan DRRM network.

Degree. The agencies with the most connections as indicated by their scores are the City Planning and Development Officer (CPDO), Philippine Red Cross (PRC), Department of Agriculture (DA), City Social Welfare and Development Office (CSWD), Local Chief Executive (LCE), and the DRRM Office. These are the offices which lead the disaster response and are most likely being tapped during disaster response in Iligan City. Also, the table shows that the results under degree centrality do have similarities with the dominant agencies under **eigenvector** centrality. The PRC, LCE, CSWD, CPDO, and DRRMO turn out to be the most influential agencies in the Iligan City DRRM network.

Betweenness. The agencies with the highest scores in betweenness centrality are the CPDO, PRC, DILG, DA, and CSWD. These scores indicate that these are the agencies who have the ability/capacity to link the different agencies (subnetworks) in the network. Given the number of connections by some agencies, there are agencies which roles are more important than the others in terms of the part they play in the network. Interestingly, the capacity of these agencies to link/bridge agencies emanates from their legal authorities: the DILG oversees the affairs of the LGUs, the CPDO leads the rehabilitation program and is usually delegated to attend coordination meeting in behalf of the LCE, the CSWD as the lead agency in disaster response of the City and the PRC as non-government organization with its own manpower and resources.

On the other hand, the distance between these agencies is also very relevant. Table 4.4 shows the scores on **closeness** centrality and the agencies with lowest scores (Accounting, ABC, MSU-IIT, CENRO followed by Dep.Ed, Budget, DRRMO, BFP, CHO, CAO, CVO, and PNP) have the shortest distance and with direct connections. These agencies deal with the crisis first handedly and

receive the information first handedly either from the community or from the Council. Ultimately, the agencies with the highest scores under closeness centrality are the agencies with the highest scores under betweenness centrality. Hence, it can be assumed that the roles of some agencies in bridging (connecting) agencies enables the other member agencies to address the crisis immediately and effectively.

Generally, the DRRM Council or the disaster management network in Iligan City is dominated and governed by the PRC, Chief Executive (the Mayor), the City Social Welfare and Development Office (CSWD), City Planning Development Office (CPDO), and the DRRM Office. The dominance of these offices stems primarily on their legal capacities as line agencies, except for the PRC, which is a non-government and a humanitarian organization. The focal person of the CSWD explained that their actions during disaster response are largely anchored on the authority of the Mayor (to give orders) as the Head of the DRRM Council and as the Local Chief Executive. The focal person of the CPDO affirmed this notion as he mentioned that during Typhoon Washi, he was attending meetings as the City Planning Officer (according to mandates in RA1021) and as the representative of the Mayor. With the trust and confidence of the LCE, the CPDO made several connections and it served as the link of some agencies to the others. On the other hand, the dominance of the PRC can be attributed to its resources and manpower being the premier humanitarian organization in providing disaster management services. The PRC showed their own system and ways of responding to disasters which are effective.

These findings show that the DRRM structure stipulated in RA10121 on how LGUs should operate during disaster response does not work in Iligan City. Moreover, the network's high degree suggests that the dominant agencies have connections with other member agencies. However, such connections can be redundant where communications bypass the dominant agencies. On the other

hand, the agencies as mandated by RA10121 are embedded in their respective clusters and are far from the rest of the network.

4.2.2 Governance Structure in the Cagayan De Oro City DRRM network

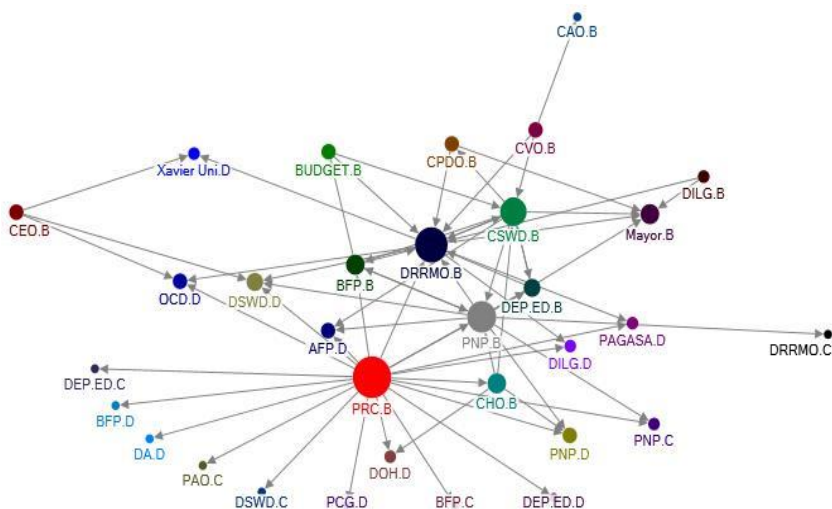
Table 4.4 The topographic metrics of the Cagayan de Oro network.

Metrics	Formal Authority Network
Node Count - Edges	39 – 77
Density	0.1079 > 0.1039 (high)
Diameter	5
Average Distance	2.371

Table 4.5 The centralization scores of the Cagayan de Oro network

Metrics	Cagayan de Oro City DRRM network
Degree	4.103
Betweenness	27.231
Closeness	0.011
Eigenvector	0.026

As shown in Table 4.4, the density of the Cagayan de Oro DRRM network is 0.108, which imply that the network has a relatively good number of connections which suggest a better information sharing. However, the network's diameter is 5 and the average distance is 2.371 which suggest that the network is less centralized as the longest distance between nodes is five steps away. This finding is supported by the network structure in Figure 4.2 which shows that the network's transactions are evenly distributed. Thus, information sharing and coordination in the Cagayan de Oro City DRRM network can be less effective. Moreover, Table 4.6 shows the centrality measures of the member-agencies of the Cagayan de Oro DRRM network.



Created with NodeXL Pro (<http://nodexl.codeplex.com>) from the Social Media Research Foundation (<http://www.smrfoundation.org>)

Figure 4.2. The Cagayan de Oro City DRRM Network Structure

Degree Centrality. Table 4.6 shows that the agencies with the most connections in the Cagayan De Oro DRRM Council are the PRC, DRRMO, PNP, Mayor, Habitat Foundation and CSWD. This data indicates that the PRC as a humanitarian organization has connected and made significant relationships between and among the agencies in the Council. Similarly, the Habitat Foundation Incorporated (Habitat), as a non-government organization has been very active during disaster response and has made various partners during the implementation of their projects. Moreover, the role of the DRRM Office, the Mayor, the PNP and the CSWD as front liners during disaster management is confirmed by their respective centrality scores.

Betweenness Centrality. Moreover, the agencies with the highest scores on betweenness are the PRC, DRRMO, Habitat for Humanity, PNP, Group Foundation Incorporated and Region X DSWD. Essentially, these agencies are considered to be in the middle of the disaster management network in Cagayan de Oro as they serve as the link between and among agencies. Such link may be attributed

to the mandates as well as the established trust of the other agencies to the agencies mentioned earlier. Hence, these agencies significantly affect the operations of the Cagayan de Oro DRRM Council.

Closeness Centrality. The distance of agencies towards each other also is of great significance too. The agencies with the shortest distance in the network are the City Agriculture Office (CAO), DILG, CVO, CPDO, DEP.ED, CHO, Budget, BFP, and CEO. These are line agencies which are directly under the Office of the Mayor. The short distances of these agencies indicate that they have the closest access to information as they are under the LCE and directly working with the affected communities.

Eigenvector Centrality. The agencies with the highest scores under eigenvector centrality are the PRC, DRRMO, PNP, CSWD, BFP, and Mayor. These findings reveal that these are the agencies which are more influential in the Cagayan de Oro City DRRM Council.

Generally, the Offices of the Mayor, DRRMO, PNP, BFP, CSWD, PRC and Habitat for Humanity dominates and governed the DRRM Council of Cagayan de Oro. This observation is validated by the consistent scores of these agencies in the measures of centrality utilized for this study. The government offices (Mayor, DRRM, PNP, and CSWD) are mandated by RA10121 to lead Council, particularly during disaster response. It is also worth noticing that two of these dominant agencies are non-governmental organizations. These data imply that aside from the strong influence of the legal mandates to these offices, leadership affects the planning as well as the trust between and among members in the Council as evidenced by the inclusion of the NGOs in the planning and implementation processes. As partners, the PRC and the Habitat for Humanity Foundation implemented activities in line with the goals and in partnership with the members of the DRMM Council. The confidence between partners likely leads to better and more effective performance.

These findings show that ties among the agencies and sectors involved in the Cagayan de Oro Council are strong as validated by the dominance of the non-state actors in the disaster-response activities. These results imply that the structure of the DRRM Council suggested in RA10121 can be modified as it is no longer applicable in Cagayan de Oro City. LGU agencies should focus on building the capacities of the community and to make them part of the decision-making process and policy implementation.

Table 4.6. Centrality scores of the Cagayan de Oro Network

Cagayan de Oro City									
Degree	In	Out	Betweenness Centrality		Closeness Centrality		Eigenvector Centrality		
1. PRC.B	21	0	21	PRC.B	305.738	PRC.B	0.016	PRC.B	0.083
2. DRRMO.B	16	10	7	DRRMO.B	191.487	DRRMO.B	0.016	DRRMO.B	0.082
3. PNP.B	12	4	9	HABITAT.B	142.204	PNP.B	0.014	PNP.B	0.071
4. HABITAT.B	12	0	12	PNP.B	76.942	DSWD.D	0.014	CSWD.B	0.057
5. CSWD.B	10	5	7	Group <u>E.Inc.B</u>	74.069	DILG.D	0.013	BFP.B	0.044
6. <u>Mayor.B</u>	7	7	0	DSWD.D	52.929	<u>Mayor.B</u>	0.013	<u>Mayor.B</u>	0.043
7. DSWD.D	6	6	0	<u>Mayor.B</u>	48.223	OCD.D	0.013	DSWD.D	0.043
8. Group <u>E.Inc.B</u>	6	0	6	CVO.B	37.000	CSWD.B	0.013	<u>DEP.ED.B</u>	0.040
9. BFP.B	5	3	3	CSWD.B	33.417	BFP.B	0.012	CHO.B	0.036
10. CHO.B	5	1	4	DILG.D	24.956	HABITAT.B	0.012	HABITAT.B	0.034
11. <u>DEP.ED.B</u>	4	3	2	OCD.D	20.373	<u>DEP.ED.B</u>	0.012	DILG.D	0.031
12. DILG.D	4	4	0	DOHD	10.190	CHO.B	0.012	OCD.D	0.029
13. OCD.D	4	4	0	Xavier <u>Uni.D</u>	9.056	PAGASA.D	0.012	AFP.D	0.029
14. PNP.D	3	3	0	BFP.B	7.662	Xavier <u>Uni.D</u>	0.012	Group <u>E.Inc.B</u>	0.029
15. AFP.D	3	3	0	CHO.B	7.362	DOHD	0.012	PNP.D	0.026
16. CPDO.B	3	1	2	BFP.D	5.540	BFP.D	0.011	BUDGET.B	0.025
17. Xavier <u>Uni.D</u>	3	3	0	<u>DA.D</u>	5.540	<u>DA.D</u>	0.011	CPDO.B	0.025
18. BUDGET.B	3	1	2	<u>DEP.ED.D</u>	5.540	<u>DEP.ED.D</u>	0.011	PAGASA.D	0.023
19. CEO.B	3	0	3	AFP.D	1.429	Group <u>E.Inc.B</u>	0.011	PNP.C	0.021
20. CVO.B	3	0	3	<u>DEP.ED.B</u>	1.429	AFP.D	0.011	DOHD	0.021
21. DOHD	3	3	0	CEO.B	0.917	CPDO.B	0.011	CVO.B	0.020
22. PNP.C	2	2	0	PNP.D	0.000	PNP.D	0.011	Xavier <u>Uni.D</u>	0.018
23. DILG.B	2	0	2	DRRMO.C	0.000	PNP.C	0.011	DILG.B	0.017
24. PAGASA.D	2	2	0	PNP.C	0.000	DILG.B	0.011	BFP.D	0.016
25. BFP.D	2	2	0	CPDO.B	0.000	CVO.B	0.011	<u>DA.D</u>	0.016
26. <u>DA.D</u>	2	2	0	DILG.B	0.000	BUDGET.B	0.010	<u>DEP.ED.D</u>	0.016
27. <u>DEP.ED.D</u>	2	2	0	PAGASA.D	0.000	PCG.D	0.010	CEO.B	0.012
28. DRRMO.C	1	1	0	BUDGET.B	0.000	DEP.ED.C	0.010	PCG.D	0.011
29. CAO.B	1	1	0	CAO.B	0.000	BFP.C	0.010	DEP.ED.C	0.011
30. PCG.D	1	1	0	PCG.D	0.000	PAO.C	0.010	BFP.C	0.011
31. DEP.ED.C	1	1	0	DEP.ED.C	0.000	DSWD.C	0.010	PAO.C	0.011
32. BFP.C	1	1	0	BFP.C	0.000	CEO.B	0.010	DSWD.C	0.011
33. PAO.C	1	1	0	PAO.C	0.000	DRRMO.C	0.009	DRRMO.C	0.010
34. DSWD.C	1	1	0	DSWD.C	0.000	DPWH.D	0.008	DPWH.D	0.005
35. DPWH.D	1	1	0	DPWH.D	0.000	DTLD	0.008	DTLD	0.005
36. DTLD	1	1	0	DTLD	0.000	BMFLD	0.008	BMFLD	0.005
37. BMFLD	1	1	0	BMFLD	0.000	<u>Governor.C</u>	0.008	<u>Governor.C</u>	0.004
38. <u>Governor.C</u>	1	1	0	<u>Governor.C</u>	0.000	PEO.C	0.008	PEO.C	0.004
39. PEO.C	1	1	0	PEO.C	0.000	CAO.B	0.008	CAO.B	0.003

As shown in Table 4.7, the density of the Misamis Oriental network is 0.169, which imply that the network has fewer connections which reduces information sharing. Moreover, the network's diameter is 2 and the average distance is 1.76 which suggest that the network is centralized as the distance between nodes is 2 steps away. Figure 4.3 validates this finding as the DRRM.C node conducts exchanges with many other members of the network which suggest a high centralization feature of the network. Thus, information sharing and coordination in the Misamis Oriental DRRM network is faster and could be efficient and effective. Meanwhile, Table 4.9 shows the centrality scores of Misamis Oriental DRRM Council.

Degree, Betweenness and Eigenvector Centrality. The agencies with the highest scores in terms of degree, betweenness and eigenvector measures of centrality in the Provincial DRRM Council of Misamis Oriental are the DRRM, DSWD, PPDO, BFP, and Governor. Essentially, these are the offices with the most connections in the disaster management network of the Province. These connections are established as legally (RA10121), these are the offices that must lead the Council. Primarily, the Governor is the Head of the DRRM provincial council which the DRRM Office serves as the Secretariat, the DSWD is the lead agency for disaster response which must be supported by the PNP and BFP particularly in camp management activities while the PPDO head the rehabilitation efforts of the Province. According to the Misamis Oriental PDRRMO representative, the DRRMO works closely with the PPDO. However, the higher scores of the DRRM Office compared to the Governor can be attributed to the authority given by the Governor to the DRRM Office to handle the affairs of the Council on his behalf. From 2010 until 2014, the nature of the DRRM Officer position is upon the appointment of the Local Chief Executive.

Consequently, the LCE appoints somebody he trusts (regardless of merits) making it easier to facilitate the affairs of the Council.

Table 4.9 The Centrality Score of Misamis Oriental DRRM Council

MISAMIS ORIENTAL									
Degree	In	Out	Betweenness Centrality		Closeness Centrality		Eigenvector Centrality		
1. DRRMO.C	25	9	23	DRRMO.C	235.233	DRRMO.C	0.040	DRRMO.C	0.118
2. DSWD.C	12	6	9	DSWD.C	17.233	DSWD.C	0.026	DSWD.C	0.090
3. PPDO.C	9	1	8	PPDO.C	8.617	PPDO.C	0.024	PPDO.C	0.071
4. BFP.C	8	3	7	BFP.C	5.117	BFP.C	0.024	DILG.C	0.067
5. DILG.C	7	0	7	DILG.C	1.7	DILG.C	0.023	BFP.C	0.067
6. <u>Governor.C</u>	6	6	0	PHO.C	1.5	<u>Governor.C</u>	0.023	<u>Governor.C</u>	0.063
7. PEO.C	5	4	2	<u>Governor.C</u>	0.4	PEO.C	0.022	PEO.C	0.055
8. PHO.C	4	2	2	PEO.C	0.2	PHO.C	0.022	BUDGET.C	0.046
9. PNP.C	4	4	0	PNP.C	0	PNP.C	0.022	PNP.C	0.046
10. BUDGET.C	4	4	2	AFP.D	0	BUDGET.C	0.022	PAO.C	0.037
11. AFP.D	3	3	0	PAO.C	0	AFP.D	0.021	AFP.D	0.037
12. PAO.C	3	3	2	PVO.C	0	PAO.C	0.021	PHO.C	0.033
13. PVO.C	2	2	1	BUDGET.C	0	PVO.C	0.021	PVO.C	0.028
14. DILG.D	2	2	0	DILG.D	0	DILG.D	0.021	DILG.D	0.025
15. OCD.D	2	2	0	OCD.D	0	OCD.D	0.021	OCD.D	0.025
16. DOH.D	2	2	0	BFP.D	0	DOH.D	0.021	DEP.ED.C	0.025
17. PRC.B	2	2	0	<u>D.A.D</u>	0	PRC.B	0.021	DOH.D	0.020
18. DEP.ED.C	2	2	2	<u>DEP.ED.D</u>	0	DEP.ED.C	0.021	PRC.B	0.020
19. BFP.D	1	1	0	DOH.D	0	BFP.D	0.020	BFP.D	0.016
20. <u>D.A.D</u>	1	1	0	DSWD.D	0	<u>D.A.D</u>	0.020	<u>D.A.D</u>	0.016
21. <u>DEP.ED.D</u>	1	1	0	PAGASA.D	0	<u>DEP.ED.D</u>	0.020	<u>DEP.ED.D</u>	0.016
22. DSWD.D	1	1	0	PCG.D	0	DSWD.D	0.020	DSWD.D	0.016
23. PAGASA.D	1	1	0	PNP.D	0	PAGASA.D	0.020	PAGASA.D	0.016
24. PCG.D	1	1	0	Xavier Uni.D	0	PCG.D	0.020	PCG.D	0.016
25. PNP.D	1	1	0	PRC.B	0	PNP.D	0.020	PNP.D	0.016
26. Xavier <u>Uni.D</u>	1	1	0	DEP.ED.C	0	Xavier <u>Uni.D</u>	0.020	Xavier <u>Uni.D</u>	0.016

Moreover, Table 4.10 also shows that the mentioned agencies are also the same set of agencies with the highest scores on Betweenness. Thus, the DRRMO, DSWD, PPDO, BFP, DILG, PHO and Governor are in between the members of the Council. These agencies provide the link and serve as the bridge for one agency to contact the other agencies in the network. For example, if the Provincial Engineering Office needs the assistance of the Army in

clearing the roads, such request will be forwarded to the region upon the approval of the LCE or the DRRM Officer.

Hence, these are the same agencies too that showed to be more influential than the other members of the Council as revealed by their higher scores under **eigenvector centrality**. Lastly, in terms of the **closeness centrality** and consistent with the previous observations, Table 4.9 showed that DEP.ED, PVO, DILG, PHO, PEO, PAO and PNP have the shortest connection among the other agencies and therefore have easier access to the information either from the ground among the affected communities or as agencies directly under the office of the LCE. Consequently, the agencies with the highest scores under closeness centrality are the same agencies which are considered to be the most influential agencies in terms of their high scores under eigenvector centrality.

Generally, the disaster management network in the province of Misamis Oriental is dominated by the DRRM Office, Governor, PPDO, DILG, BFP and the DSWD. The DSWD being the lead agency in disaster response is indeed influential in the provincial DRRM Council. The Governor, being the Chief Executive gives authority to the DRRM Office to steer the Council. This act of trust affects the performance of the Council in general because the leadership of the Council will be on the hands of the DRRM Officer. Moreover, such performance of the Council which was assessed by the respondents as "average to good" can be attributed to the lack of equipment, resources, communication facilities as well as bureaucracy in the government which refers to the delay in the release of funds for relief and response related activities. On the other hand, there were respondents who elaborated that they are still not familiar with the disaster management protocols/plans in the process. They added that during disasters, they are being asked to man the operation center either to answer calls, monitor updates and other related tasks which they do and fulfill seriously.

These findings imply that the governance structure of the Provincial DRRM Council of Misamis Oriental is highly centralized. Figure 4.3 validates the high centralization characteristic of the network as the DRRMC deals with many other agencies in the network. Despite the high number of ties with other agencies as revealed by the network density, the low closeness centrality score, as well as the low diameter and average distance, revealed that the dominant agencies or key players in the Provincial DRRM Council is near to important agencies and there are multiple paths or transactions in the network.

4.2.4 Governance Structure in the Region X DRRM Network

As shown in Table 4.10, the density of the Region X network is 0.05, which imply that the network has fewer connections. Moreover, the network's diameter is 4 and the average distance is 2.508 which suggest that the network is less centralized as the distance between nodes is 4 steps away. Figure 4.4 shows that the network has low centralization given that the majority of the nodes are connected to many other agencies in the network. Thus, information sharing and coordination in the Region X DRRM network is slow and less effective.

Table 4.10 Topographic metrics of the Regional network.

Metrics	Formal Authority Network
Node Count - Edges	58 - 172
Density	0.0526 < .10405 (low)
Diameter	4
Average Distance	2.508

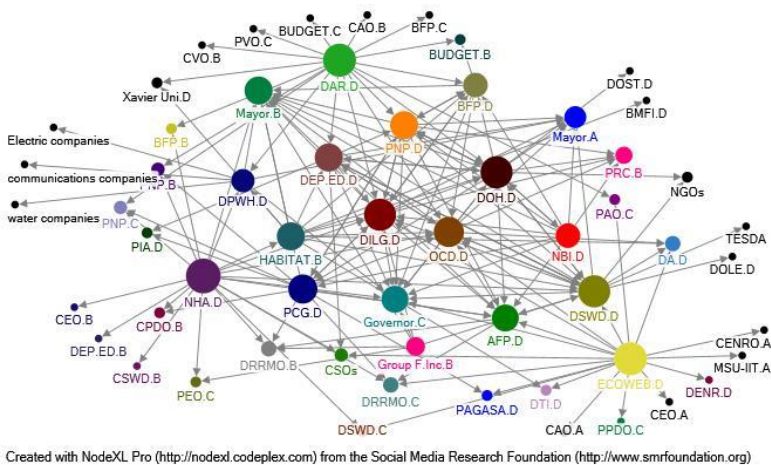


Figure 4.4. The Region X DRRM Network Structure

Table 4.11. The centralization scores of the **Region X** network.

Metrics	Region X DRRM network
Degree	5.586
Betweenness	88.517
Closeness	0.007
Eigenvector	0.017

The centrality scores of the Region X DRRM Council members are presented in Table 4.12. In terms of degree, the highest scores are with the NHA, ECOWEB, DAR, DSWD, DOH, DILG and OCD. This data indicates that these are the agencies in the Regional Council which have the greatest number of connections and consequently leading the disaster response in the region. This dominance in the disaster management network is attributed to the mandates given to these agencies by RA10121: the DSWD leads the disaster response, the DILG leads the disaster preparedness with its authority among PNP, BFP, and LGUs, the DOH being the lead agency on health, the OCD which serves as the Head of the Council, the AFP to lead the retrieval operations, and the NHA to lead on the

rehabilitation activities. In the compliance of the mandated tasks, these agencies inevitably establish the most connections as necessary in leading and performing well.

On the other hand, in terms of Betweenness centrality, the highest scores are the ECOWEB, DAR, NHA, DSWD, DPWH, DILG and Habitat for Humanity. The high scores show that these agencies are in the middle of the disaster management network as they serve as the connection among agencies. Without these agencies, members of the network may have difficulty in properly performing their functions.

Moreover, the agencies with the shortest distance (**closeness centrality**) in the regional network are the electric, water, and communication companies and the DENR. These are followed BMFI (Balay Mindanao Foundation Inc.), PIA (Philippine Information Agency), DOST, DOLE, NBI, DTI, TESDA, NGOs and CSOs and the PAGASA. Common among these agencies are (a) the services they provide directly benefits the community and (b) these agencies maximize the potential benefits of the services they provide upon the reinforcement of other agencies. For example, the information provided by the PAGASA (Philippine Astronomical Geophysical Services Administration) is best utilized thru the DOST, PIA, and LGUs for wide dissemination. Also, the services provided by DOLE (Dept of Labor and Employment) and DTI (Dept of Trade and Industry) is best delivered with NGOs (BMFI), CSOs and TESDA. Hence, these are the agencies which are closer to the community and the other agencies and therefore, they have easier access to information necessary to best address the needs of the affected communities.

Table 4.12 The Centrality Scores in the Region X DRRM Council

REGION 10									
Degree	In	Out	Betweenness Centrality		Closeness Centrality		Eigenvector Centrality		
1. NHA.D	20	0	20	ECOWEB.D	800.328	DILG.D	0.010	DILG.D	0.059
2. ECOWEB.D	18	0	18	DAR.D	756.190	OCD.D	0.010	DOH.D	0.057
3. DAR.D	18	0	18	NHA.D	749.891	DSWD.D	0.009	DSWD.D	0.052
4. DSWD.D	17	8	12	DSWD.D	376.271	Governor.C	0.009	OCD.D	0.051
5. DOH.D	17	8	13	DPWH.D	362.904	NHA.D	0.009	PNP.D	0.048
6. DILG.D	17	11	9	HABITAT.B	284.367	DOH.D	0.009	Mayor.B	0.048
7. OCD.D	15	9	8	DILG.D	269.848	AFP.D	0.009	DEP.ED.D	0.046
8. PCG.D	14	4	12	OCD.D	237.905	Mayor.B	0.009	Governor.C	0.044
9. <u>DEP.ED.D</u>	13	5	11	DOH.D	228.459	HABITAT.B	0.009	AFP.D	0.042
10. PNP.D	13	7	10	PCG.D	190.805	DAR.D	0.009	NHA.D	0.039
11. Mayor.B	13	13	0	Governor.C	163.805	DEP.ED.D	0.009	HABITAT.B	0.039
12. HABITAT.B	13	1	12	DEP.ED.D	136.330	PNP.D	0.009	NBLD	0.038
13. Governor.C	12	12	0	AFP.D	107.527	ECOWEB.D	0.009	BFP.D	0.037
14. AFP.D	12	9	3	Mayor.B	82.918	DPWH.D	0.008	PCG.D	0.036
15. NBLD	10	1	10	BFP.D	61.439	BFP.D	0.008	DAR.D	0.033
16. BFP.D	10	6	6	PNP.D	53.371	PCG.D	0.008	Mayor.A	0.033
17. DPWH.D	9	3	6	PAO.C	40.041	CSOs	0.008	ECOWEB.D	0.029
18. Mayor.A	8	8	0	Group E.Inc.B	29.139	DA.D	0.008	PRC.B	0.022
19. Group E.Inc.B	6	0	6	PNP.C	24.787	NBLD	0.008	DPWH.D	0.021
20. PRC.B	5	5	0	PNP.B	24.787	Mayor.A	0.007	Group E.Inc.B	0.019
21. DRRMO.C	4	4	0	DRRMO.C	24.149	DRRMO.C	0.007	DA.D	0.015
22. DRRMO.B	4	4	0	Mayor.A	23.576	PNP.C	0.007	DRRMO.C	0.013
23. DA.D	4	4	0	CSOs	19.812	PNP.B	0.007	DRRMO.B	0.012
24. PNP.C	3	3	0	BFP.B	15.247	Group E.Inc.B	0.007	CSOs	0.010
25. PNP.B	3	3	0	DSWD.C	13.769	PAO.C	0.007	NGOs	0.010
26. CSOs	3	3	0	NBLD	11.815	BFP.B	0.007	PNP.C	0.010
27. Xavier Uni.D	2	2	0	DRRMO.B	8.616	DRRMO.B	0.007	PNP.B	0.010
28. PIA.D	2	2	0	DA.D	8.239	DSWD.C	0.007	PIA.D	0.007
29. PEO.C	2	2	0	DTLD	8.239	DTLD	0.007	CPDO.B	0.007
30. PAO.C	2	2	0	PAGASA.D	7.693	PRC.B	0.007	BFP.B	0.006

Furthermore, among all the important functions of each agency, the most influential according to the highest scores under **eigenvector centrality** are the DILG, DOH, DSWD, OCD, PNP, and Cagayan de Oro Mayor. These agencies are lead agencies in the different aspects of disaster response. Thus, they are the most influential among all the other member agencies.

Common among the member agencies in the Region X DRRM Council members consider that the performance of the Council is “good if not excellent” despite the several challenges they have. The representative of the BFP explained that they have enough

manpower but insufficient firetrucks. Other respondents believe that "we have done our best and we can help address the basic and urgent concerns during disaster response." The representative of the ECOWEB expounded that there was poor camp management due to the lack of facilities and qualified people to run the camp but despite these, the ECOWEB representative added that the Region X Council members are excellent in their performance since the disaster response activities were "systematic, well-coordinated and activities are plan-based."

Statistically, the findings the network density shows lesser ties among the network members. However, the Region X DRRM network has high betweenness score which explains that though the ties are few, yet these are significant ties for the network operations. Also, the low closeness centrality implies that the lead agencies have few ties from the small number of agencies to many others.

4.2.5 DRRM Networks in Region X: Summary

The data showed interesting findings among the characteristics of the governance networks in the local government units and the regional level. Table 1 shows that the Iligan City DRRM network has a 0.219 density score while Cagayan de Oro has 0.108, Misamis Oriental has 0.169 and the Region X has a 0.05 density score. The value of the density scores suggests that in the Local Government Units of Misamis Oriental, Cagayan de Oro, and Iligan City, there are relatively a number of connections (high density) among their respective networks. However, the density of the networks of the Region X DRRM Council and the over-all DRRM network in the Region is low which implies fewer connections among member-agencies in the network. This observation is plausible based on the frequency of the actual interaction among members of the network. When interviewed on 06 December 2016, Ms. A. Caneda, Head of the Office of the Civil Defense explained that "the Regional

DRRM Council gathers at least 4 times in a year as it is required by Republic Act 1012 and during these regular meetings, some members are not able to attend due to their respective meetings and appointments while other agencies send their staff to represent them”.

The comparison of the diameter metric scores reveals that the Misamis Oriental DRRM Council has a diameter of 2 with an average distance of 1.76. On the other hand, Iligan, Cagayan de Oro, Region X and the overall network has a diameter of 4, 5, 4, and 5; with an average distance of 2.003, 2.371, 2.508 and 2.401 respectively. This data suggests that the local disaster management networks, primarily the Misamis Oriental DRRM network, have more connections than the rest of the disaster networks. Generally, the networks' high-density scores, lower diameter, and lower average distance are products of a lesser number of network members which suggest easier familiarity between and among agencies. On the hand, the regional and over-all disaster management networks' low density and higher average distance suggest a lesser connected relationship between member agencies. However, the characteristics of the local disaster management networks show that there is high density, higher diameter, and the average distance are almost the same as the rest of the networks.

Therefore, member-agencies in the regional and local disaster management networks are sparsely connected as revealed in the diameter and average distance scores. However, in the local disaster networks, more connections are established among member-agencies as implied by the higher density scores. This situation is validated in the statement of the Iligan City Social Welfare and Development focal person, Ms. P. Mantos. When interviewed on 25 November 2016, Ms. P. Mantos, stated that: “I can say that I am already familiar with the focal person of the different agencies in the City DRRM Council, except for the new ones. We have been seeing each other in the different activities of the City. However, our only real interaction

is only during the regular meeting/s of the Council, disaster management planning or response. Some of these focal persons are replaced by their agencies and are assigned to another unit. It was quite challenging to request an information or data with them during disaster planning, especially during disaster response operations”. Furthermore, these findings suggest that there are processes in the network that generate minimal information sharing which causes ineffective coordination and inefficient disaster response operations in Region X Philippines.

Table 4.13 Topographic metrics and centrality scores of the networks

Topographic Metrics	Formal Authority Network				
	Iligan	Cagayan de Oro	Misamis Oriental	Region X	Overall
Node Count; Edges	27 - 71	39 – 77	26 - 45	58 - 172	78 - 313
Density	0.2193 > 0.2022 (high)	0.1079 > 0.1039 (high)	0.1692 > 0.1380 (high)	0.0526 < .10405 (low)	0.1165 < 0.1563 (low)
Diameter	4	5	2	4	5
Ave Distance	2.003	2.371	1.76	2.508	2.401
Centralization Measures					
Degree	5.704	4.103	4.231	5.586	9.091
Betweenness	14.037	27.231	10.385	88.517	54.442
Closeness	0.019	0.011	0.022	0.007	0.006

certain agency. For example, the Department of Education leads the Education Cluster, Department of Health for the Health Cluster. The Office of the Civil Defense oversees these operations. However, I cannot say that the OCD or a certain agency in Region X is most influential or more dominant in the network”.

Meanwhile, in terms of betweenness, the overall network and the Region X DRRM network have high betweenness centralization scores with 54.442 and 88.517 (see Table 1). While the betweenness centralization scores of Iligan, Cagayan and Misamis Oriental – 14.037, 27.231, and 10.385 – are relatively low. These data suggest that the Regional Offices works as a bridge in the entire network in terms of sharing information and resources during disaster-related operations (see Figure 2). Hence, the Regional agencies control the flow of information in the network. Moreover, the Region X disaster network may have fewer connections, yet these are significant ties which are vital for the network operations as revealed by its betweenness centralization score (see Table 1). Additionally, the closeness centrality scores of DRRM networks in Region X (see Table 2) suggest the proximity of the regional agencies to the other agencies and organizations in the entire regional network. Thus, this validates the finding that the Regional disaster management network is highly centralized while the local disaster management networks are less centralized in terms of betweenness. The highly centralized nature of the Regional network in terms of betweenness is validated in the statement of the Region X DSWD focal person, Ms. E. Cardona. When interviewed on 15 November 2016, Ms. E. Cardona mentioned that "disaster management in the region is clustered to properly address the specific needs and concern during disaster response. Each cluster has its own lead agency. As we take over the disaster operations from the LGUs, we always make sure that we provide the needs of the affected communities by facilitating the processes involved particularly by coordinating with other agencies and organizations across the Region".

Table 4.14. The summary of the centrality scores of each DRRM network

Centrality Scores of the Iligan City DRRM Network						
Degree		Betweenness		Closeness		
1.	CPDO.A	14	CPDO.A	84.355	PRC.A	0.026
2.	PRC.A	14	PRC.A	82.701	CPDO.A	0.025
3.	DA.A	12	DILG.A	54.058	Mayor.A	0.024
4.	CSWD.A	11	DA.A	42.192	CSWD.A	0.024
5.	Mayor.A	11	CSWD.A	26.220	DRRMO.A	0.023
6.	DRRMO.A	10	Mayor.A	24.685	DA.A	0.022
7.	DILG.A	9	CEO.A	19.553	CEO.A	0.022
8.	CEO.A	8	DRRMO.A	12.911	CHO.A	0.021
9.	DEP.ED.A	8	CVO.A	10.938	DEP.ED.A	0.021
10.	PNP.A	8	PNP.A	7.985	CVO.A	0.021
Centrality Scores of the Cagayan de Oro City DRRM Network						
Degree		Betweenness		Closeness		
1.	PRC.B	21	PRC.B	305.738	PRC.B	0.016
2.	DRRMO.B	16	DRRMO.B	191.487	DRRMO.B	0.016
3.	PNP.B	12	HABITAT.B	142.204	PNP.B	0.014
4.	HABITAT.B	12	PNP.B	76.942	DSWD.D	0.014
5.	CSWD.B	10	Group F.Inc.B	74.069	DILG.D	0.013
6.	Mayor.B	7	DSWD.D	52.929	Mayor.B	0.013
7.	DSWD.D	6	Mayor.B	48.223	OCD.D	0.013
8.	Group F.Inc.B	6	CVO.B	37.000	CSWD.B	0.013
9.	BFP.B	5	CSWD.B	33.417	BFP.B	0.012
10.	CHO.B	5	DILG.D	24.956	HABITAT.B	0.012
Centrality Scores of the Province of Misamis Oriental DRRM Network						
Degree		Betweenness		Closeness		
1.	DRRMO.C	25	DRRMO.C	235.233	DRRMO.C	0.040
2.	DSWD.C	12	DSWD.C	17.233	DSWD.C	0.026
3.	PPDO.C	9	PPDO.C	8.617	PPDO.C	0.024
4.	BFP.C	8	BFP.C	5.117	BFP.C	0.024
5.	DILG.C	7	DILG.C	1.7	DILG.C	0.023
6.	Governor.C	6	PHO.C	1.5	Governor.C	0.023
7.	PEO.C	5	Governor.C	0.4	PEO.C	0.022
8.	PHO.C	4	PEO.C	0.2	PHO.C	0.022
9.	PNP.C	4	PNP.C	0	PNP.C	0.022
10.	BUDGET.C	4	AFP.D	0	BUDGET.C	0.022
Centrality Scores of the Region X DRRM Network						
Degree		Betweenness		Closeness		
1.	DRRMO.C	28	DSWD.D	347.327	Accounting.A	0.004
2.	DSWD.D	25	ECOWEB.D	343.293	ABC.A	0.004
3.	PRC.B	24	AFP.D	275.800	Electric co.	0.004
4.	DILG.D	23	DRRMO.C	252.923	water cO.	0.004
5.	DOH.D	22	DPWH.D	239.017	DRRMO.B	0.004
6.	OCD.D	20	Mayor.A	205.844	DENR.D	0.004
7.	AFP.D	20	DOH.D	203.066	MSU-IIT.A	0.004
8.	NHA.D	20	DAR.D	201.270	CENRO.A	0.004
9.	Mayor.A	19	PRC.A	165.561	CAO.B	0.004
10.	DRRMO.B	19	NHA.D	161.394	DEP.ED.A	0.005
11.	Mayor.B	18	PRC.B	149.957	BMFI.D	0.005
12.	Governor.C	18	DILG.D	149.884	BUDGET.A	0.005
13.	ECOWEB.D	18	DRRMO.B	143.919	DILG.B	0.005
14.	DAR.D	18	HABITAT.B	111.105	PIA.D	0.005
15.	PNP.D	16	OCD.D	107.539	DRRMO.A	0.005

Table 4.14 shows the list of agencies from each network with the highest scores according to the centrality measures: degree, betweenness, and closeness. Table 4.14 revealed that the dominant agencies in the DRRM networks of Iligan and Cagayan de Oro are not exactly the agencies who belong in the mandated structure of the National Disaster Response Plan (Figure 1). Interestingly, the involvement of the non-government agencies such as the Philippine Red Cross, Habitat Foundation, and Group Foundation Incorporated implies that disaster response-related activities in the Local Government Unit could be improved and sustained. Hence, such collaboration needs to be strengthened. When interviewed on 06 January 2017, the representative of the Philippine Red Cross in Iligan City, Mr. G. Galucan, shared that “a day after Typhoon Washi hit the Region, we immediately mobilized our volunteers and resources to help in the rescue operations”. The Touch Foundation Incorporated focal person recounted their experience too. When interviewed on 10 January 2017, Mr. I. Borja narrated that "our organization was not ready for disaster response, but we were receiving donations from our partners from all over the Philippines, so we attempted to coordinate with the LGU, but there was no focal person in charge to receive the donations. Worst, at that time, the City Mayor of Cagayan de Oro was not around, and the impact of Washi overwhelmed the DSWD, DRRM Office and other agencies in the City. So, we capacitated ourselves, mobilized our members and distributed the goods to the victims of the typhoon in coordination with Xavier University and Catholic Church of Cagayan de Oro”.

The absence of bureaucratic protocols in the operations of the mentioned non-government agencies is one of the reasons that enable them to respond faster and effectively. Noteworthy, the characteristics of the disaster management networks described above - highly dense with sparsely connected member agencies and less centralized in terms of degree, implies that the existing structure of the disaster management networks is not suitable in Region X as

manifested by its ineffective disaster response operations. When interviewed on 13 November 2016, most of the interviewed survivors of Typhoon Washi shared "we were not rescued in our homes. We brought ourselves to the evacuation centers near us, bringing nothing but ourselves and family members. We had nothing, and we were not able to contact our relatives because there was no electricity and no signal on cellular phones. We relied on the relief goods distributed by NGOs and private agencies. Relief goods from the government were delivered weeks after the typhoon." The Iligan City former DRRM Officer, Mr. A. Bendijo, expounded that bureaucratic protocols did not work in their favor. When interviewed on 28 November 2016, Mr. A. Bendijo said that "the government has funds for disaster response but prior to its utilization, the Local DRRM Council has to convene first and declared that the City is in the State of Calamity, and it took weeks for both DRRM Councils to convene. Also, the funds are subjected to the regular procurement processes of the government. So, it took a while for the City Government to utilize the fund and fully address the needs of the Typhoon survivors".

4.2.6 Discussion

Significant findings are observed from the chosen DRRM networks in the Philippines. Primarily, in terms of the topographic characteristics of the networks, the density scores are high among the Local Government Units of Misamis Oriental, Cagayan de Oro, and Iligan City, while there is a low density in the Region X DRRM Council. This data suggests that the lesser the number of network members, the more connections between and among member-agencies and organizations are established. Similarly, networks with more members such as Region X, connections are hardly established since agencies and organizations are divided among clusters.

Networks with low density imply fewer connections among member-agencies. Fewer connections further imply that there are lesser cases

or opportunities for face-to-face encounters or similar activities that enhance the quality of the relationship between and among agencies which lead to fewer interdependences and low trust in the network (Ansell and Gash, 2008). Kapucu (2005) noted that effective response and recovery operations require collaborations and trust between government agencies at all levels and between the public and nonprofit sectors. Providing incentives fosters inter-organizational communication and trust that enables accelerating inter-organizational network coordination in emergency management response operations (Kapucu, 2006; Ansell and Gash, 2008; Tang and Tang, 2014). Building interdependencies among agencies and organisations through interactive processes increases trust, builds social capital and can develop into a collaborative culture which can substantially increase the speed of decision making and can lead to successful collaborations (Ansell and Gash, 2008, Jung, Mazmanian and Tang, 2009; Paraskevopoulos, 2010; Kapucu, Arslan, & Demiroz, 2010; Emerson et al., 2012; Shaw and Goda, 2004; and Shimada, 2015). On the other hand, networks with low density and highly centralized are found to be effective conditions for network effectiveness (Raab, Manna and Cambre, 2015). However, the regional disaster management network has low density and less centralized in terms of degree which suggests weak disaster management structure as characterized by low trust, lack of interdependencies and slow-paced decision making during disaster management operations in Region X.

Meanwhile, the presence of the cluster-based lead agency in the Region is shown in the centralization scores of the network (see Table 2). Table 2 shows that in the Regional disaster network, the agencies with the greatest number of connections are considered to be the most important agencies in the network are similar to the agencies mandated by the Republic Act 10121 to lead the disaster response operations in the Region according to their respective clusters. Thus, in terms of centralization scores, the entire disaster

management network in Region X mirrors the mandated structure in the Republic Act 10121. According to the Republic Act 10121, the disaster management network is structured with a lead agency governing the activities in every cluster and is facilitated by the Office of the Civil Defense. In terms of the Region X's network characteristics, there are only 52 connections out of the 152 mentioned agencies. Hence, network density at the regional level is low. This implies that there is weak collaboration in the regional network which resulted in the minimal information sharing and less effective and less efficient operations. Consequently, trust and interdependencies were low due to the lack of opportunities to have face-to-face encounters among member-agencies at the regional level. These findings confirm the study of Bharosa et al., (2008) that most agencies in collaborative efforts appreciate the advantages of collaboration but only a few are actually willing to collaborate.

Many scholars believe that disaster management networks should be decentralized. However, Kapucu (2006) argued that decision-making should be centralized to provide clear direction for the disaster operations which should be decentralized. Figure 2 suggests that in the Regional network, no single agency leads the entire disaster response operations despite the implementation of the cluster approach. This finding validates the evaluation report of the Tropical Storm Washi "there was no clear instruction or direction on what to do during the entire response stage, everybody was in shock." This finding suggests weak collaboration in the overall network of disaster management which resulted in the minimal information sharing and less effective and less efficient operations. The minimal network information sharing supports the findings of Jatmiko and Tandiarang (2014) that new structure should be built in order for information sharing in the network to be strengthened. These findings on the network analysis confirm the theory of Provan and Kenis (2008) that as the number of network members increases, trust is

sparsely distributed throughout the network which in order to be effective, the network has to be governed by a lead agency.

On the other hand, the disaster management networks in Local Government Units revealed distinctive findings. The topographic characteristics of the networks in the Local Government Units of Misamis Oriental, Cagayan de Oro, and Iligan City have high-density scores with relatively higher average distance and diameter. With a lesser number of member-agencies, more connections within local disaster management networks are established.

Moreover, Table 2 revealed that the agencies involved in the "actual" local disaster networks are different from the "mandated agencies" according to Republic Act 10121 (see Figure 1). According to the actual governance structure (see Figure 2), there is no single agency that dominates their respective disaster response networks except in the case of the Province of Misamis Oriental where the role of the Provincial Disaster Risk Reduction Management Office is glaring being the biggest node in the provincial disaster network (followed by the Provincial Department of Social Welfare and Development). For the Cities of Iligan and Cagayan de Oro, the disaster networks are governed by not just the designated agencies of the Local Chief Executive but also by non-government organizations such as the Philippine Red Cross which acted voluntarily. The latter is not part of the mandated agencies but turned out to be influential and able to exercise leadership during the networks' disaster response.

Furthermore, the tall-structure and the lead-organization form of network governance (Provan and Kenis, 2008) which is centralized in nature, does not work in the local disaster management networks because of the dominance of non-government agencies. This finding supports the study of Lester and Krejci (2007) that

leadership during disaster management is not about who holds the authority to lead and direct the disaster operations but more importantly, on who exercises actual leadership in times of crisis. This study strengthens the theory of Bryson et al., (2006) that the ambiguity of membership which lies in the hierarchy of collaboration where members have overlapping partnerships across networks, and complexity on local environments such as lack of implementation on existing (environmental) policies (Alvarez et al., 2015), alter the structures among collaborative actions. On the other hand, ambiguity and complexity on local environments are simplified when agreements are attained through an inclusive collaborative process in the network which is often achieved in a flat-structured organization, instead of hierarchies (Bryson, Crosby and Stone, 2015).

This study further corroborates the findings of Chang-Seng (2010) that the structure may be ideal, but it does not necessarily imply that it is suitable in the community as factors such as social norms and political culture might get in the way. This finding also confirms the study of Kapucu and Van Wart (2008) that decentralized decision making in the form of an excessive reliance on centralized authorities could bring more harm than good particularly if the authorities are not fully committed to addressing the needs and resolving the various challenges along the way. In the case of the LGU in the Philippines, the LCE holds the authority and serves as the emergency manager as mandated by the Republic Act 10121. Hence, emergency managers should fully grasp the value of collaboration by capacitating the members of the network and the community (Kapucu, Arslan, and Collins, 2010).

Therefore, this study suggests that a highly centralized disaster network with a shared-governance and a flat structure should be considered to enhance the competence of the local agencies through an inclusive collaborative process in order to attain agreements, foster interdependencies and sustain reliable

partnerships in the Region's disaster management networks. The strong presence of the non-government agencies (Table 2) suggests that sustainable partnership/collaboration between non-government and government agencies could lead to a more effective disaster management network, thus, better disaster response. With definite and sound government structures, CSOs can harness its potentials in crisis situations which could go beyond rapid damage assessments (Alegado, 2014; Paramita, 2012). Thus, adopting a highly centralized network with shared-governance in structuring the disaster management networks lead to sustainable and effective structures and processes in the disaster management operations.

4.2.7 Conclusion

Generally, the Philippine disaster management networks in Region X failed to respond effectively during the Typhoon Washi in 2010 because of significant reasons. Primarily, the over-all disaster management network in Region X has a low density which means that trust and interdependencies were low due to the lack of opportunities to have face-to-face encounters among member-agencies at the regional level. Moreover, decision making in the regional disaster management network is less centralized as revealed by the lack of a dominant or lead agency in the entire regional disaster management. This implies that there is weak collaboration in the regional network which resulted in the minimal information sharing and ineffective disaster response.

On the other hand, the disaster management networks in Local Government Units have high-density scores with relatively lower average distance and diameter due to the lesser number of member-agencies. Hence, the smaller the network, the more connected it gets. Despite the relative cohesiveness in the local management networks, the presence and dominance of non-

government agencies imply lack of capacities in terms of decision making and resources among the mandated agencies and complexity on local environments such as bureaucratic protocols change the network structure. These network characteristics reduce the capacities of the local disaster management networks which leads to weak disaster operations.

Therefore, the tall-structure and the lead-organisation form of network governance (Provan and Kenis, 2008) which is centralised in nature, does not work in the local and regional disaster management networks in Region X Philippines because in the regional level, such structure does not build interdependencies among agencies while at the local level, disaster response operations are constrained by bureaucratic protocols which makes disaster management networks less effective. Hence, shared governance should be explored. Structurally, a mixture of the forms of network governance – lead organization and shared governance - should be investigated. At the national and regional levels where many organizations are part of the network, centralized decision making is necessary and disaster operations should be decentralized (Kapucu, 2005). However, trust and inter-dependency should be cultivated in centralized networks to come up with effective mechanisms during disasters.