Organizational Network Analysis (ONA) of Fisheries Co-management in Lakes Malawi, Malombe & Chilwa.

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Fisheries Integration of Society and Habitats (FISH)

Cover Page Photograph: Fishers about to set off fishing from a beach in Lake Malombe

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Abbreviations and Acronyms

ADC	Area Development Committee
APEA	Applied Political Economic Analysis
BVC	Beach Village Committee
CPI	Community Performance Index
DDP	District Development Plan
DFO	District Fisheries Office
FA	Fisheries Association
FAO	Food and Agriculture Organization of the United Nations
FISH	Fisheries Integration of Society and Habitats Project
GVH	group village headman
NGO	nongovernmental organization
ONA	Organizational Network Analysis
TA	traditional authority
VDC	Village Development Committee
VNRMC	Village Natural Resource Management Committee

Executive Summary

The Organizational Network Analysis (ONA) used by Pact, from its global experience, has identified a set of tools and methodologies to assess networking, to reinforce and build the constituencies/social capital required for making tough policy choices and strengthening good governance at all levels. The outcome, leading to improved structures, processes and adaptability to changing conditions. The ONA was applied to co-management in fisheries in Malawi's 3 main lakes (Lake Malawi, Malombe and Chilwa) to look at linkages between organizations in terms of *nodes* and *ties*. Nodes are the individual organizations within a network, and ties are the relationships between those organizations.

The study was conducted at TA level and revealed:

For Lake Malombe, for TA Chowe: The number of linkages in the network is 107, corresponding to a network density of 45 percent. This suggests that there is already considerable tangible networking happening among the organizations. About 13 of the 16 organizations (81 percent) have reached out to other organizations to obtain information and/or resources related to fisheries co-management. This indicates that there is some significant exchange already happening among the organizations. And, 15 organizations (94 percent) that are part of the network have provided other organizations information and resources related to fisheries co-management activities. This network has a centralization score of 0.074, making it a less vulnerable network.

For Lake Malawi, for TA Mponda: Out of 240 possible, the number of linkages in the network is 72, corresponding to a network density of 30 percent. This suggests that there is already some tangible networking happening among the organizations. About 10 of the 16 organizations (63 percent) have reached out to other organizations to obtain information and/or resources related to fishing. This indicates that there is some significant exchange already happening among the organizations. All the 16 organizations (100 percent) that are part of the network have provided other organizations information and resources related to fisheries co-management. This network has a centralization score of 0.194, making it a less vulnerable network.

For Lake Chilwa, for TA Kawinga: A total of 9 of the 13 organizations (69 percent) have reached out to other organizations to obtain information and/or resources related to fishing. This indicates that there is some significant exchange already happening among the organizations. A high 12 organizations (92 percent) have provided other organizations information and resources related to fish programming This network has a centralization score of 0.125, making it a less vulnerable network.

In conclusion:

a. All the three TAs average 33 percent network density meaning that there is already some tangible coordination happening among the institutional structures at community level. This is to the advantage of the fisheries co-management however it is low because there is no organization to coordinate meetings where fisheries successes and challenges could be discussed. DoF needs to create such a platform, notably at FA level for ecosystem based management.
b. Results have shown that Chiefs, both TAs and GVHs, have an important role in fisheries co-management and this role must be taken note of and TAs should be involved in FA

and in fisheries development plans and enforcement. There is a need to improve coordination with Chiefs and the Fisheries Department.

c. Some BVCs understand their role in fisheries co-management but there is need for more civic education to engage them in their role.

d. Stakeholders at TA level understand the importance of coordinating their efforts in fisheries co-management but they require more support in terms of capacity development and funding.

a. Fisheries co-management should be linked to mainstreaming in the organic management meetings that currently take place such as at VDC and ADC or TA level. This process would help stakeholders to tackle developmental challenges.

b. The same meetings could also be used for capacity building of these structures, explaining their roles in fisheries co-management as well as mainstreaming fisheries management in local development planning.

c. BVCs need more support from the Fisheries Department to curb illegal fishing (e.g. by trawlers in Area A of the eastern arm of the lake).

1. Background

Institutional capacity and good governance are at the center of creating the enabling environment for community co-management of natural resources, such as fisheries and is therefore at the heart of the Fisheries Integration of Society and Habitats (FISH) Project. Pact, from its global experience, has identified a set of tools/methodologies termed Organizational Network Analysis (ONA) are at the center of creating the enabling environment for FISH. Therefore, Pact has identified a set of tools/methodologies that reinforce and build the constituencies/social capital required for making tough policy choices and strengthening good governance at all levels, leading to improved structures, processes, and adaptability to changing conditions.

Pact's approach to ONA is to use it as a diagnostic tool that can be applied with and through local stakeholders to map a social or institutional network, to better understand the relationships between different actors and stakeholders. It provides a forum for coordination, collaboration, and mutual goal-setting. ONA views interactions in terms of nodes and ties or linkages that enable people to interact and learn from or derive support from each other. Any network's structure is made of nodes (generally individuals or organizations) that are tied by one or more specific type of relationships. This could be linked to information exchange, resource exchange and collaboration around activities or mutual support or enforcement. The ONA can be used as a tool to track the exchange of information and resources, including funding, equipment, supplies, training or intellectual capital, as well as the strength and quality of relationships and collaboration between stakeholders in a given network.

Networks of individuals and organizations pursuing similar goals exist everywhere in human society and can become the backbone of a successful society or institution. However, many struggle to reach their full potential for a number of reasons, for example ineffective communication, poor leadership, low interpersonal trust, and a lack of resources. On one hand, when individuals and organization face complex and persistent challenges, it can be too much to tackle alone. On the other hand, when people reach out to others and unite as a network under a common goal, leveraging knowledge, talent, and resources, anything is possible. This is where Pact's network strengthening approaches, including tools like ONA, can find application in biodiversity conservation and climate change adaptation, and are particularly helpful in designing project support. Through earlier studies like Community Performance Index (CPI) and Applied Political Economic Analysis (APEA), Pact has identified several challenges which ONA will try to address. These are:

1. Low co-management governance capacity of fisheries resources particularly at district and community level

2. Overfishing due to the "open access" nature of fisheries and poor enforcement and low regulatory compliance in fisheries co-management

3. Lack of sufficient communication and coordination between stakeholders to better manage fisheries resource use

1.1. Objectives of ONA

The objective of this activity is to identify strengths and weaknesses of Beach Village Committees (BVCs) and Fisheries Associations (FAs), as well as their governance and support networks, and to ultimately inform the development of network strengthening plans and actions to achieve a shared vision of sustainable fisheries management.

1.2. Expected Outputs

The expected outputs from ONA are to:

1. Produce ONA maps and metrics showing how local structures in the targeted districts of Machinga and Mangochi network in fisheries management

2. Guide the BVC/FA organization and networking for fisheries co-management

3. Inform FISH partners on the development of appropriate BVC/FA network strengthening plans and strategy, and guiding the inclusion in the lake management plan and mainstreaming in the District Development Plan (DDP)

2. Introduction to the ONA Methodology

(ONA is a tool that helps visualize patterns of interaction among members of a network. The results of an ONA application are also informative for discussions about network effectiveness or network strengthening. The tool analyses social relationships between organizations in terms of nodes and ties. *Nodes* are the individual organizations within a network, and *ties* are the relationships between those organizations.

Pact's approach to ONA involves the following three stages.

1. **Participant survey**: A network analysis survey tool is developed by facilitators, often in collaboration with participants. The survey includes questions about the flows of information, resources, and collaboration that are important to the network.

   Network surveys may be undertaken with a bounded group, in which case answers are limited to a predefined cadre of individuals or organizations. Alternatively, surveys may be unbounded, in which case respondents are encouraged to enter the name of any individual or organization with whom they have interacted in the manner described by the question.

   To maximize participant understanding and data quality, surveys are usually facilitated with the full group of participants present. However, surveys may also be implemented with small groups, as individual interviews or as surveys sent to participants.

2. **Data analysis**: The results of the ONA survey are input into InFlow, a network analysis software application. InFlow has inbuilt algorithms that generate network maps, positioning organizations or individuals according to their connections with others. InFlow also includes a range of performance measurements that can be used to generate deeper understanding and support the monitoring of network development over time.

3. **Participatory feedback**: Although the network maps and metrics are useful in their own right, they are most powerful when used to facilitate discussions with network members. The questions generated by analyzing the ONA results can help to draw out extremely valuable qualitative observations about a network that can form the basis of a plan to increase network effectiveness.

ONA provides key information that can be used to develop strategies for network strengthening. ONA maps can be compared over time to analyze progress made by members in strengthening relationships among network members. They can also help to identify key resource or information organizations in the network and members that are isolated and/or underutilized. ONA maps also help to visualize where information/resource bottlenecks occur

and strategize ways to improve collaboration among network members given existing patterns.

3. Baseline ONA Process in Mangochi and Machinga

On August 4–7, 2015, FISH facilitated ONA survey meetings in three traditional authorities where the project is being implemented. The survey was conducted in two TAs in Mangochi, TA Chowe with structures operating around Lake Malombe and TA Mponda with structures operating around Lake Malawi, while one TA was selected in Machinga, TA Kawinga with structures operating around Lake Chilwa. ONA feedback sessions were conducted on September 1–4, 2015 in the same TAs. These TAs were selected as a representative sample of all TAs where FISH is being implemented, with the assumption that the results of the ONA survey from these areas will be similar to all areas and that the network strengthening strategies developed from these areas will be replicated in all the TAs of the project. An average of 15 structures and organizations involved in the fishing industry from each of these TAs participated in the surveys and the feedback meetings. The meetings were organized with the support of the District Fisheries Office (DFO) in each of the two districts.

The objectives of the meetings were to:

- Collect ONA surveys from participants: government departments, fish structures, and nongovernmental organizations (NGOs) implementing FISH-related activities in each TA

- Discuss the challenges and find solutions to networking and collaboration, and to strategize and plan on how to formalize and strengthen a FISH network in the TA

3.1. Meeting Agenda

Pact presented on the ONA methodology during the first meeting to clarify ONA for participants. During the meeting, participants practiced filling out the ONA survey form and the group went through the process together to ensure the quality of data collected. During the feedback meeting participants discussed the results by looking at the network map and comparing it to the network metrics which came out. Participants discussed challenges/barriers that they have been experiencing with networking and determined solutions to the barriers/challenges, which they presented in plenary, where more discussions followed.

3.2. Plenary Discussions

The following barriers/challenges to networking were discussed in plenary:
- Lack of resources and adequate funds to help conduct meetings
- Knowledge gap on interpersonal communication
- Lack of coordination meetings
- Negative attitude/approach of government officers in the area on the issues (e.g., fisheries, agriculture, health)
- Poor reporting channels
- Lack of leadership commitment to keep the network active

The strategies to brainstormed to improve networking include:
- Commitment even when meetings are not funded
- Fairness in sharing resources
- Conduct interface or coordination meetings

- Continuity in member representation (proper handovers when leaving station)
- Ability to share locally available resources
- Improve funding from partners running the programs
- Improve attitude through civic education
- Conduct meetings and exchange visits between districts for cross learning
- Improve channels of communication/reporting by sharing experiences
- Conduct regular network meetings
- Reporting issues to relevant authorities (e.g., district level, donor)
- Capacity building on networking

More qualitative information from the feedback sessions is discussed in detail in Section 4.

The ONA survey questionnaire (annex) filled out by participants included the following question:

> *In the past 6 months, how often have you exchanged information or resources related to fishing activities with the organizations on the following list? Please enter a number from the scale below to indicate the frequency with which you collaborated with each organization (leave blank if there was no collaboration).*

> *5: Daily/Several Times a Day*
> *4: Weekly/Several Times a Week*
> *3: Monthly/Several Times a Month*
> *2: Several Times a Year*
> *1: Once or Twice in a Year*

4. ONA Results

4.1. Results of TA Chowe ONA

Figure 1 shows the ONA map for TA Chowe. The arrows on the map indicate the direction of the relationship. Connections in a network occur in two directions, from participant A to participant B and from participant B to participant A. Since participants complete separate survey forms, their answers do not necessarily mirror one another, and it is not uncommon for network members to report links with others that are unreciprocated.

Figure 1. ONA Map for TA Chowe
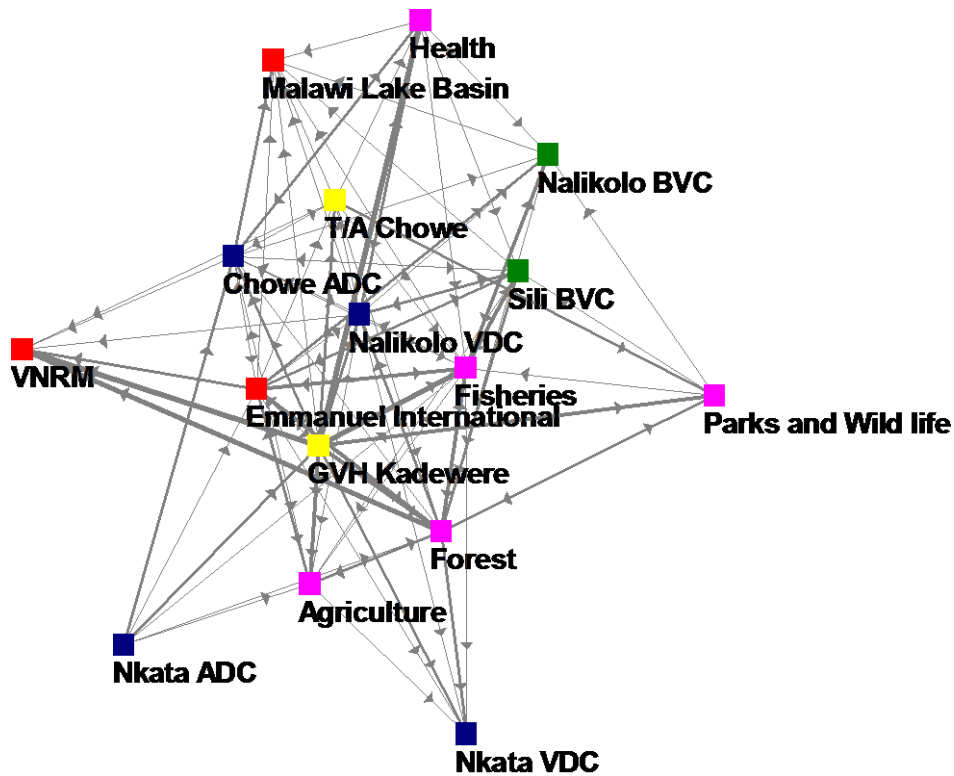
The color of the nodes indicates the type of organization:

- Red: NGO
- Green: BVC
- Yellow: Chief
- Deep Blue: VDC/ADC
- Purple: Government Department

4.1.1 Analysis of TA Chowe Data

While most organizations that filled out the survey indicated that they are exchanging information related to fisheries co-management with other organizations in the areas, there is more room for enhanced collaboration. If all the organizations were exchanging/sharing information, there would be 240 linkages (16 organizations * 15 possible links) in the network map. However, in reality the number of linkages in the network is 107, corresponding to a network density[1] of 45%. This suggests that there is already more tangible networking happening among the organizations in the TA. What needs to be done is just to develop strategies on how to improve the collaboration further.

Degrees out describes the number of connections that a network member reports having the other members. *Nodes with high degrees out index scores are therefore those network members that consider themselves to be particularly active in networking with others*. Emmanuel International seconded by group village headman (GVH) Kadewere then Nalikolo

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[1] *Network density* is a commonly used measure in ONA. It is a percentage calculated by dividing the number of actual linkages in the network by the total number of linkages that would exist if every network member were linked to every other member. Thus, the higher the *network density*, the more connected the network is.

VDC had the highest degrees out. Thirteen of the 16 organizations (81%) participating in the ONA survey have reached out to other organizations to obtain information and/or resources related to fisheries co-management. This indicates that there is some significant exchange already happening among the organizations.

Table 1. Degrees Out for TA Chowe

Degrees out	Name	Degrees out	Name
0.800	Emmanuel International	0.400	Agriculture
0.800	GVH Kadewere	0.400	Health
0.800	Nalikolo VDC	0.400	Nalikolo BVC
0.733	Chowe ADC	0.400	Nkata ADC
0.600	T/A Chowe	0.267	Parks and Wild life
0.533	Fisheries	0.000	Malawi Lake Basin
0.533	Forest	0.000	Nkata VDC
0.467	Sili BVC	0.000	VNRM

Degrees in describes the number of connections that other network members report having with a particular network member. *Nodes with high degrees in scores are therefore considered to be key resource hubs for the network.* It may be strategic for the network to connect other members to these resources, or alternatively to direct members to currently underutilized resources. Fisheries followed by Forestry and Chowe ADC had the highest scores within the district. Fifteen organizations (94%) that are part of the network have provided other organizations information and resources related to fisheries co-management activities except Nkata ADC.

Table 2. Degrees In for TA Chowe

Degrees in	Name	Degrees in	Name
0.800	Fisheries	0.400	Nkata VDC
0.733	Forest	0.400	Sili BVC
0.600	Chowe ADC	0.400	VNRM
0.600	Emmanuel International	0.333	Health
0.600	Malawi Lake Basin	0.267	GVH Kadewere
0.600	Nalikolo VDC	0.267	TA Chowe
0.533	Agriculture	0.200	Parks and Wild life
0.400	Nalikolo BVC	0.000	Nkata ADC

Although the connectivity of individual nodes (organizations in the map) is important, it may not be those members with the most connections that hold the overall network together. The **between-ness score** is an index score between 0 and 1 that describes the extent to which an individual member acts as a bridge between different nodes, thus maintaining the viability and sustainability of the overall network. Nodes with high between-ness scores are powerful actors with the potential to make or break the network. They can also be bottlenecks by holding up the flow of resources or information within the network. Forestry followed by

Nalikolo VDC and Emmanuel International have the highest between-ness score in the network. It was surprising to note that Forestry instead of Fisheries is at the core of this network. Further scrutiny revealed that Forestry has more activities on the ground than Fisheries and engages the communities throughout the year, while Fisheries only engage the communities during the closed season.

Table 3. Between-ness Scores for TA Chowe

Between-ness	Name	Between-ness	Name
0.100	Forest	0.011	TA Chowe
0.091	Nalikolo VDC	0.010	Agriculture
0.077	Emmanuel International	0.009	Health
0.063	Chowe ADC	0.008	Parks and Wildlife
0.056	Fisheries	0.000	Malawi Lake Basin
0.030	GVH Kadewere	0.000	Nkata ADC
0.021	Nalikolo BVC	0.000	Nkata VDC
0.021	Sili BVC	0.000	VNRM

If connectivity within a network is dominated by a small number of nodes with a particularly high between-ness score, then the network is considered to be vulnerable. The network is likely to fragment if one or more of the bridge nodes leave. The **centrality score** is an index score for the entire network, based on the between-ness scores of individual actors. Centrality scores range from 0 to 1, and any score approaching or exceeding 0.3 describes a network that is vulnerable. This network has a centralization score of 0.074, making it a less vulnerable network.

4.1.2. Qualitative Discussion of Results from TA Chowe

Initial observations. Participants were asked to look at the map and imagine it is a bicycle tire. Then they were asked, "Who do you think are the hubs on the map?" The results reflects a ranking of:

- TA Chowe
- Fisheries
- Nalikolo VDC
- Emmanuel International
- GVH Kadewere
- Sili BVC
- Chowe ADC

According to the results this is also where most of the organizations go to get services, information, and materials. Table 4 shows the roles of different institutions in the network.

Table 4. Roles of Institutions that Network at TA Chowe on Fisheries Co-Management Issues

Name of Institution	Role of the Institution
GVH Kadewere	Before anyone starts fishing activities they go first to the GVH to register his/her name to find a place to stay. (They also go to the Fisheries personnel to register the fishing gear).
	A popular fish landing site in Lake Malombe is located at GVH Kadewere and the GVH has good working relationship with the local communities.
Nalikolo VDC	Health goes to the BVC to discuss with the members on illegal usage of mosquito nets as a fishing gear.
	Sili BVC share boundaries with Nalikolo BVC, and they work together during closed season to confiscate illegal fishing gears.
	Forest works with Nalikolo BVC by providing permits to collect firewood in the Forest areas which is used for smoking fish.
Fisheries	Provide extension services to fishing communities around Lake Malombe West on fisheries co-management, for example fisheries legislation, hygienic fish processing methods, and fish marketing.
Sili BVC	Work closely with fishers and all the community members in the implementation of fisheries co-management activities.
Chowe ADC	Acts as a bridge between VDCs at the TA level and the District Council on developmental projects at the district level.
Emmanuel International	Most FISH activities in the area are spearheaded by Emmanuel International because this is their working area as a partner in the project.
Parks and Wildlife	Parks and wildlife work with fishermen all the times. They rescue fishers when they are caught by crocodiles, the rangers hunt the crocodiles and kill them. The interface of Liwonde National Park and Lake Malombe, especially within the 100 meter band, is a protected area. Most of the fish breed at this area and the national park rangers guard this area and as a result of this protect the fish found there. They take all the poachers to court once they are caught.
	Game rangers go to the lake to set traps for crocodiles and other aquatic mammals so that they protect fishermen and other local people from any attack.
Agriculture	Agriculture work hand in hand with Fisheries on co-management activities, conservation activities, and food security issues.

At the end of the discussion, Parks and Wildlife reminded the fishermen to be very careful when seining around the shallow fishing grounds near the emerged aquatic weeds because this is the same areas where crocodiles like to rest early in the morning in search for fish to eat. This type of fishing is called Usodzi Wadala.

TA Chowe gave his remarks on the importance of ONA activity: it acted as an eye opener to the local-level institutions on the need for networking to promote fisheries co-management in Lake Malombe. The TA wished that this could be a recurrent activity to enable partners to discuss challenges and agree on ways forward.

What is the value chain network of the fish caught from Lake Malombe to the consumer? Fish from Lake Malombe are caught by fishermen who sell to either fish traders

or fish processors (sun drying, frying, cooking, brining, and smoking). After the fish is processed it is sold to fish traders, and, if the fish is going to the city, transporters take the fish to urban markets and deliver them to fish retailers who sell the fish to consumers. Figure 2 shows the Lake Malombe fish value chain.

Figure 2. Value Chain of Fish Caught in Lake Malombe

| Fishers catch the fish selling 99% of the fish catch. Most of the fish is sold fresh without ice. | → | Fish traders/ processors possess the fish for less than one week and selling 99% of the fish. | → | Retail sector vendors, restaurants sell 99% of the fish domestically to consumers |
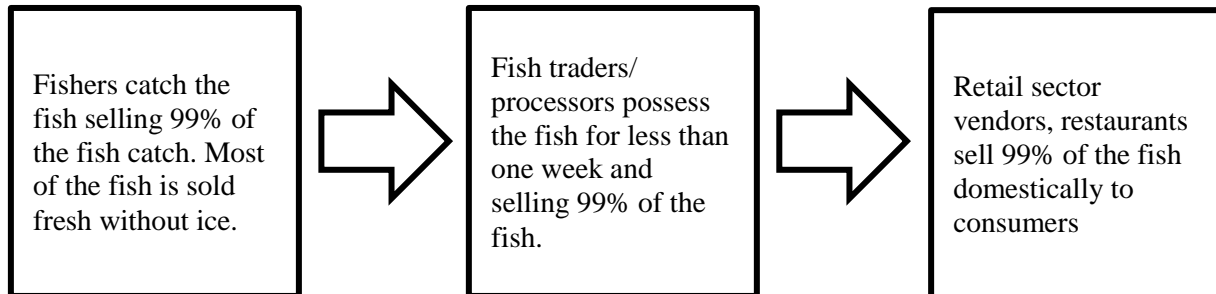
How do they fix fish prices? Fish has no fixed price; it depends on the catch of the day (supply versus demand).

Changes in weather patterns, such as Mpoto winds versus Mwera winds, can cause an elevation in price. Price also depends on the availability of fish from other lakes when fish traders meet at the market; prices lower when more fish is available. Lack of storage facilities to reduce spoilage also force the fish traders to sell the fish at lower prices.

4.2. Results of TA Mponda ONA

Figure 3 is the ONA map for TA Mponda.

Figure 3. ONA Map for TA Mponda
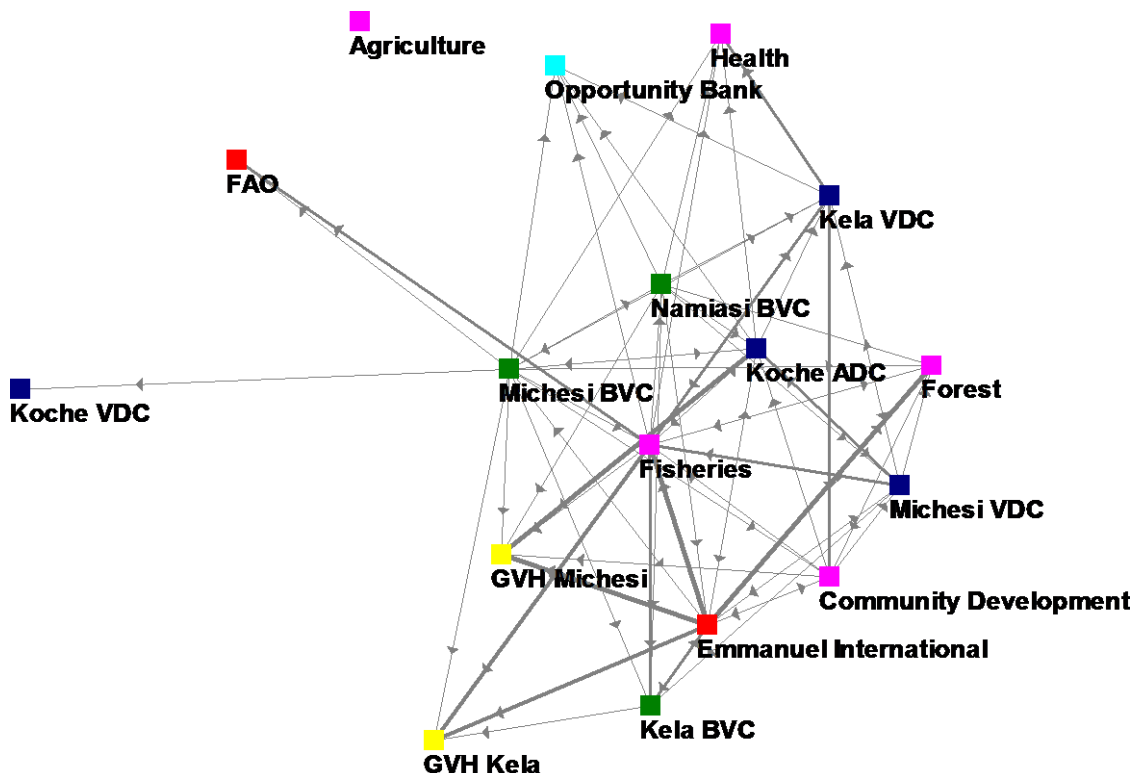
The color of the nodes indicates the type of organization:

- Red: NGO
- Green: BVC
- Yellow: Chief
- Deep blue: VDC/ADC
- Purple: Government department
- Sky blue: Private organization

4.2.1. Analysis of TA Mponda Data

While most organizations that filled the survey indicated that they are exchanging information related to fisheries co-management with other organizations within the TA, there is more room for enhanced collaboration. If organization were exchanging information, there would be 240 linkages (16 organizations * 15 possible links) in the network map. In reality, however, the number of linkages in the network is 72, corresponding to a network density of 30%. This suggests that there is already tangible networking happening among the organizations in the TA. What needs to be done is just to develop strategies on how to improve the collaboration further.

Degrees out describes the number of connections that a network member reports having with other members. *Nodes with high degrees out index scores are therefore those network members that consider themselves to be particularly active in networking with others.* Michesi BVC seconded by fisheries then Namiasi BVC had the highest degrees out. Ten of the 16 organizations (63%) that participated in the ONA survey have reached out to other organizations to obtain information and/or resources related to fishing. This indicates that there is some significant exchange already happening among the organizations.

Table 5. Degrees Out for TA Mponda

Degrees out	Name	Degrees out	Name
0.933	Michesi BVC	0.133	Forest
0.733	Fisheries	0.133	Kela BVC
0.667	Namiasi BVC	0.000	FAO
0.600	Emmanuel International	0.000	GVH Kela
0.533	Koche ADC	0.000	GVH Michesi
0.400	Michesi VDC	0.000	Health
0.333	Community Development	0.000	Koche VDC
0.333	Kela VDC	0.000	Opportunity Bank

Degrees in describes the number of connections that other network members report having with a particular network member. *Nodes with high degrees in scores are therefore considered to be key resource hubs for the network.* It may be strategic for the network to connect other members to these resources, or alternatively to direct members to currently underutilized resources. Fisheries followed by Emmanuel International and GVH Michesi had the highest scores within the district. All the 16 organizations (100%) that are part of the network have provided other organizations information and resources related to fisheries co-management.

Table 6. Degrees In for TA Mponda

Degrees in	Name	Degrees in	Name
0.467	Fisheries	0.333	Kela VDC
0.400	Emmanuel International	0.333	Opportunity Bank
0.400	GVH Michesi	0.267	Community Development
0.400	Koche ADC	0.267	GVH Kela
0.400	Michesi VDC	0.200	Michesi BVC
0.333	Forest	0.133	FAO
0.333	Health	0.133	Namiasi BVC
0.333	Kela BVC	0.067	Koche VDC

Although the connectivity of individual nodes (organizations in the map) is important, it may not be those members with the most connections that hold the overall network together. The ***between-ness* score** is an index score between 0 and 1 that describes the extent to which an individual member acts as a bridge between different nodes, thus maintaining the viability and sustainability of the overall network. Nodes with high between-ness scores are powerful actors with the potential to make or break the network. They can also be bottlenecks by holding up the flow of resources or information within the network. Fisheries followed by Emmanuel International and Michesi BVC have the highest between-ness score in the network.

Table 7. Between-ness Scores for TA Mponda

Between-ness	Name	Between-ness	Name
0.228	Fisheries	0.010	Forest
0.162	Emmanuel International	0.007	Kela BVC
0.133	Michesi BVC	0.000	FAO
0.077	Koche ADC	0.000	GVH Kela
0.045	Community Development	0.000	GVH Michesi
0.039	Michesi VDC	0.000	Health
0.019	Kela VDC	0.000	Koche VDC
0.018	Namiasi BVC	0.000	Opportunity Bank

If connectivity within a network is dominated by a small number of nodes with a particularly high between-ness score, then the network is considered to be vulnerable. The network is likely to fragment if one or more of the bridge nodes leave. The **centrality score** is an index score for the entire network, based on the between-ness scores of individual actors. Centrality scores range from 0 to 1, and any score approaching or exceeding 0.3 describes a network that is vulnerable. This network has a centralization score of 0.194, making it a less vulnerable network.

4.2.2 Qualitative Discussion of Results from TA Mponda

Table 8. Role of Different Institutions at TA Mponda that Network on Fisheries Co-Management Issues

Name of Institution	Role of the Institution
Koche VDC	Showed only one network connection only. Its main role is to facilitate developmental meetings at the GVH level related to fisheries co-management and acts as a bridge between BVC and ADC at TA level.
GVH Kela	Has so many network connections from other institutions because it champions and arranges the community meetings related to fisheries.
Kela BVC	The network tie is thin because the old BVC committee was not working properly. The trawler owners who illegally fish in Area A of Lake Malawi (prohibited to trawler fishing) corrupted previous BVC committee by offering jobs to committee members in return for allowing them to fish in Area A. hence it did not serve the interest of the other ordinary BVC members. The new BVC committee is just 1 ½ months old and is trying very hard to get back in control. Main role of the BVC is to work with the fishers and all community members in the implementation of fisheries co-management activities for example conducting awareness meetings on recommended fishing gears and report the feedback to fisheries.
Opportunity Bank	Have many network arrows pointing to them because fish traders and other community members get loans to boost their fishing business. Provides Small Medium Enterprises Loans to community members.
Health	They work with fishers around the lake on health education and good sanitation in the lakes especially migratory fishermen.
Forest	Provide seedlings to communities planted along the major rivers that drain in Lake Malawi and provide permit to access the forest reserve areas to the community. People collect firewood for fish processing and timber for making fishing boats. They also give technical advice to community members who want to own private tree nurseries.

**Active networkers.** Fisheries, Emmanuel International, Koche ADC, and Michesi BVC are the institutions holding the network together. Most of the community members go to these institutions to get services and materials related to fisheries co-management. The current percentage of the network is 30% but the participants wish it could reach above 50%.

4.3. Results of TA Kawinga ONA

Figure 4 is the ONA map for TA Kawinga.

Figure 4. ONA Map for TA Kawinga
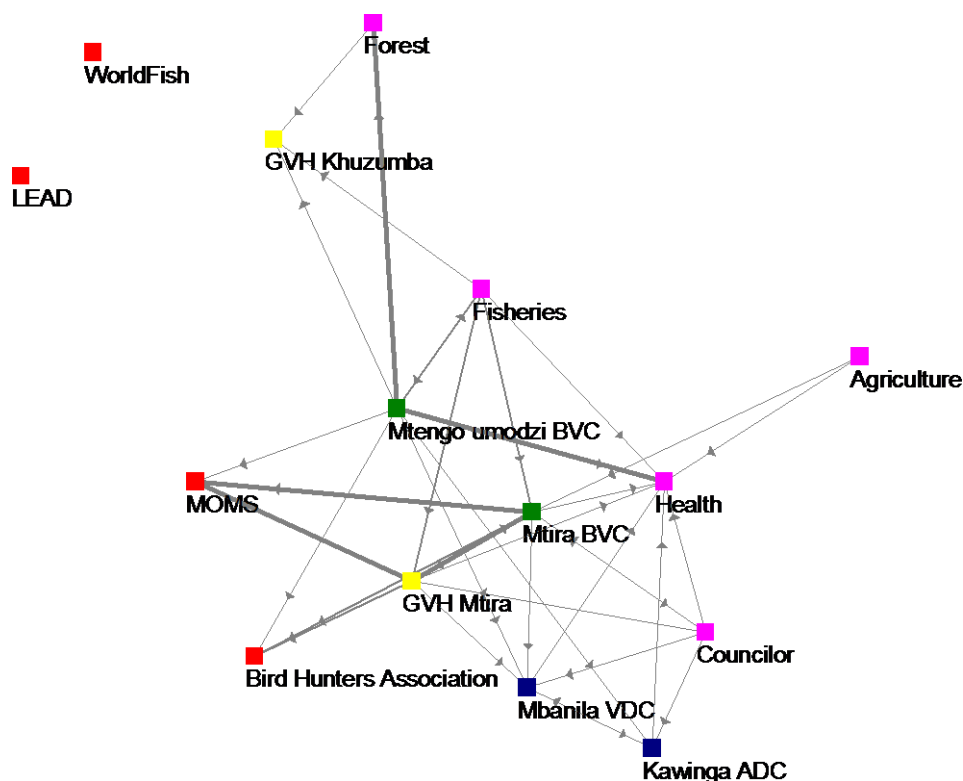
4.3.1 Analysis of TA Kawinga Data

Most organizations that filled out the survey indicated that they are exchanging information related to fishing with other organizations in the TA, but there is more room for enhanced collaboration. If organizations were exchanging information, there would be 156 linkages (13 organizations * 12 possible links) in the network map. In reality, however, the number of linkages in the network is 36, corresponding to a network density of 23%. This suggests that there is already some form of networking happening among the organizations in the TA. What needs to be done is to develop strategies on how to improve the collaboration further.

Degrees out describes the number of connections that a network member reports having with other members. Nodes with high degrees out index scores are therefore those network members that consider themselves to be particularly active in networking with others. Mtengo Umodzi BVC seconded by Mtira BVC then Councilor had the highest degrees out. Nine of the 13 organizations (69%) that participated in the ONA survey have reached out to other organizations to obtain information and/or resources related to fishing. This indicates that there is some significant exchange already happening among the organizations.

Table 9. Degrees Out for TA Kawinga

Degrees out	Name	Degrees out	Name
0.667	Mtengo umodzi BVC	0.167	Mbanila VDC
0.500	Mtira BVC	0.083	Forest
0.417	Councilor	0.000	Bird Hunters Association
0.417	Fisheries	0.000	GVH Khuzumba
0.417	GVH Mtira	0.000	Health

Degrees out	Name	Degrees out	Name
0.167	Agriculture	0.000	MOMS
0.167	Kawinga ADC		

Degrees in describes the number of connections that other network members report having with a particular network member. *Nodes with high degrees in scores are therefore considered to be key resource hubs for the network.* It may be strategic for the network to connect other members to these resources, or alternatively to direct members to currently underutilized resources. Health followed by Mbanila VDC and Mtira BVC had the highest scores within the district. Twelve organizations (92%) that are part of the network have provided other organizations information and resources related to fish programming except Agriculture. A discussion on why not even one is connected to them showed that people are not aware of the role of the Agriculture department in fishing. This belief was changed after it was explained how they play a big role in the fishing industry.

Table 10. Degrees In for TA Kawinga

Degrees in	Name	Degrees in	Name
0.667	Health	0.250	MOMS
0.417	Mbanila VDC	0.083	Councilor
0.333	Mtira BVC	0.083	Fisheries
0.250	Bird Hunters Association	0.083	Forest
0.250	GVH Khuzumba	0.083	Mtengo Umodzi BVC
0.250	GVH Mtira	0.000	Agriculture
0.250	Kawinga ADC		

Although the connectivity of individual nodes (organizations in the map) is important, it may not be those members with the most connections that hold the overall network together. The **between-ness score** is an index score between 0 and 1 that describes the extent to which an individual member acts as a bridge between different nodes, thus maintaining the viability and sustainability of the overall network. Nodes with high between-ness scores are powerful actors with the potential to make or break the network. They can also be bottlenecks by holding up the flow of resources or information within the network. Mtira BVC followed by Fisheries and Mtengo Umodzi BVC have the highest between-ness score in the network.

Table 11. Between-ness Scores for TA Kawinga

Between-ness	Name	Between-ness	Name
0.136	Mtira BVC	0.000	Bird Hunters Association
0.037	Fisheries	0.000	Forest
0.037	Mtengo umodzi BVC	0.000	GVH Khuzumba
0.025	GVH Mtira	0.000	Health
0.025	Mbanila VDC	0.000	Kawinga ADC
0.012	Councilor	0.000	MOMS
0.000	Agriculture		

If connectivity within a network is dominated by a small number of nodes with a particularly high between-ness score, then the network is considered to be vulnerable. The network is likely to fragment if one or more of the bridge nodes leave. The **centrality** score is an index score for the entire network, based on the between-ness scores of individual actors. Centrality scores range from 0 to 1, and any score approaching or exceeding 0.3 describes a network that is vulnerable. This network has a centralization score of 0.125, making it a less vulnerable network.

4.3.2 Qualitative Discussion of Results from TA Kawinga

Table 12. Role of Institutions that Network at TA Kawinga on Fisheries Co-Management Issues

Name of Institution	Role of the Institution
WorldFish	Had meeting at Namanja beach with Mtira BVC and Mtengo Umodzi to coordinate Lake Chilwa management plans. Their main role is research on fisheries and aquaculture currently they do not have a project in TA Kawinga.
LEAD	No contacts were done within the last six months. They have no activities taking place at the moment.
Mtira BVC	Mainly networks with Fisheries on co-management issues.
GVH Mtira	Mainly networks with Fisheries on co-management issues.
Kawinga ADC	Most of the institutions work in isolation they do not involve the ADC members. They just involve the ADC at the initial stage of the project to inform the ADC of their work in the area and continue working in isolation.
Agriculture	Provide extension services on improving food security in the area. It was also noted that people in this area do not know that Fisheries Department is under the Ministry of Agriculture.
MOMS	This is a Management of Monitoring System under Parks and Wildlife. They work with fishers around Lake Chilwa on different landing sites helping fishermen in record keeping of the fish catches every day. They provide measuring scales to track the number of fish caught on daily basis.
Health	They work with fishers around the lake on good sanitation in the lakes especially on the fishermen who stay in temporary shelters known as *Zimbowera* on Lake Chilwa.
Forest	Provide seedlings which they plant along the major rivers which drain into Lake Chilwa and also permit to access the forest reserve areas to the community. People collect firewood for fish processing and timber for making fishing boats. Forest carries out similar activities.

4.4. Results of Fisheries ONA Plenary Discussions

The results of the plenary discussions are summarized in Table 13 and elaborated below:

Table 13: Summary of Barriers and Solutions to Improve Co-management Networking in Fisheries

Challenges/Barriers	Solutions

Lack of resources adequate funds to help in conducting meetings	• Commitment, even when meetings are not funded • Fairness in sharing resources • Ability to share locally available resources • Improve funding from partners running the programs
Knowledge gap on interpersonal communication	• Capacity building on networking • Conduct meetings, exchange visits among districts for cross learning on best practices
Lack of coordination meetings	• Conduct interface or coordination meetings
Negative Attitude of government officers in the area e.g. Fisheries, Agriculture, Health (approach to issues)	• Improve attitude by providing civic education on better approaches to engaging user communities
Poor reporting channels	• Timely reporting on issues to relevant authorities e.g. district level, donor. • Improve communication channels of /reporting by sharing experiences
Lack of leadership commitment to keep the network active	• Continuity in member representation (proper handovers when leaving station) • Provide capacity in leadership and leadership styles • Conduct regular network meetings

The ONA participants identified the following barriers or challenges to fisheries networking

- Lack of resources adequate funds to help in conducting meetings
- Knowledge gap on interpersonal communication
- Lack of coordination meetings
- Negative Attitude of government officers in the area e.g. Fisheries, agriculture, health (in their approach to issues)
- Poor reporting channels
- Lack of leadership commitment to keep the network active

Strategies to improve networking in fisheries that came out of the plenary sessions, included:

- Commitment even when meetings are not funded
- Fairness in sharing resources
- Conduct interface or coordination meetings
- Continuity in members representation (proper handovers when leaving station)
- Ability to share locally available resources
- Improve funding from partners running the programs
- Improve attitude by civic education
- Conduct meetings, exchange visits among districts for cross learning
- Improve channels of communication/reporting by sharing experiences
- Conduct regular network meetings
- Reporting issues to relevant authorities e.g. district level, donor.

- Capacity building on networking

More qualitative information from what came out during the feedback sessions has been discussed in detail below under analysis of results for each TA.

5. Summary of ONA Results from All Traditional Authorities

- The results from all the three TAs shows that there is an average of 33% network density, meaning that there is already more tangible coordination happening among the community-level structures, which is advantageous to FISH. However, the network density is low because there is no organization to coordinate meetings where successes and challenges could be discussed.

- Results have shown that Chiefs, both TAs and GVHs, have an important role in fisheries co-management and this role must be taken note of. On the other hand there are also structures and organizations working within the community which have more influence in the fishing sector; BVC, VDC/ADC, Fisheries Department, Forestry Department, and Agriculture Department. We have also noted that NGOs operating in these areas are important stakeholders. Some stakeholders are health focused, though participants could not clearly articulate their role, and commercial banks that provide capital in the fish value chain.

- Some BVCs understand their role in fisheries co-management, but there is need for more civic education to cement their role and improve coordination with Chiefs and the Fisheries department.

- Stakeholders at the TA level understand the importance of coordinating their efforts in fisheries co-management, but they require more support in terms of capacity development and funding for this to be implemented.

6. Recommendations and Way Forward

The conclusions extracted from the ONA survey lead to the following recommendations.

- FISH should take advantage of the fact that there is already low but tangible networking and collaboration happening among the stakeholders at the TA level. It is important for FISH to strengthen these linkages. This could include encouraging meetings between these stakeholders monthly or quarterly. This should be linked to the organic meetings that currently take place, such as at VDC and ADC or TA level. This process would help stakeholders to tackle challenges they need to address, and FISH could act as a catalyst. The same meetings may also be used for capacity building of the structures in fisheries co-management, as well as for mainstreaming fisheries management in local development planning. Meetings are the core activity, which ensures communication, coordination, information exchange, and the like to enhance the functionality of a network.

- One of the issues that came out of the feedback meetings from TA Mponda was that the new BVC from Kela is not getting enough support from the Fisheries Department to curb illegal fishing by trawlers in Area A of the eastern arm of the lake. This is just one of the many challenges in coordinating and communicating among the stakeholders.

Appendix 1. List of Organizations that Participated in the Survey, by Traditional Authority

No.	Organization	No.	Organization	No.	Organization
TA Mponda		**TA Chowe**		**TA Kawinga**	
1	Community Development	17	Agriculture	33	Bird Hunters Association
2	Emmanuel International	18	Chowe ADC	34	Councilor
3	FAO	19	Emmanuel International	35	Fisheries
4	Fisheries	20	Fisheries	36	Forest
5	Forest	21	Forest	37	GVH Khuzumba
6	GVH Kela	22	GVH Kadewere	38	GVH Mtira
7	GVH Michesi	23	Health	39	Health
8	Health	24	Malawi Lake Basin	40	Kawinga ADC
9	Kela BVC	25	Nalikolo BVC	41	MOMS
10	Kela VDC	26	Nalikolo VDC	42	Mbanila VDC
11	Koche ADC	27	Nkata ADC	43	Mtengo umodzi BVC
12	Koche VDC	28	Chowe VDC	44	Mtira BVC
13	Michesi BVC	29	Parks and Wild life	45	Agriculture
14	Michesi VDC	30	Sili BVC		
15	Namiasi BVC	31	TA Chowe		
16	Opportunity Bank	32	VNRM		

Appendix 2. ONA Survey Questionnaire

PACT FISH ONA SURVEY: MANGOCHI DISTRICT

Organization Name: _____

TA: _____

Name of Contact Person (filling form): _____

E-mail Address: _____

Phone numbers: _____

Type of Organization (Tick):

☐   NGO   ☐   CBO   ☐   Government Office

****

In the past 6 months, how often have you exchanged information or resources related to **fisheries co-management** with the organizations on the following list? Please enter a number from the scale below to indicate the frequency with which you collaborated with each organization (leave blank if there was no collaboration).

5: Daily/Several Times a Day
4: Weekly/Several Times a Week
3: Monthly/Several Times a Month
2: Several Times a Year
1: Once or Twice in a Year

#	Name of Organization	Indicate frequency of collaboration by inserting number from the scale above (1 to 5).
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		