# Chapter 8
# Disaster Management as a Complex System: Building Resilience with New Systemic Tools of Analysis


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**Abstract** This chapter introduces an alternative perspective to study disaster preparedness and risk reduction (DP/DRR) systems. Study shows that by applying systems thinking and complexity theory we understand better the dynamics and interconnectedness of the DP/DRR. This applies both to interconnected risks (multirisk landscapes) and interconnected actors (multi-actor networks).

These results are part of the broader study commissioned by the Finnish Red Cross (FRC). The aim of the thematic study was to promote institutional learning on DP/DRR project experiences and practices that can benefit better programming in the future. The overall objective of the study was to identify critical issues in designing, implementing and monitoring and evaluation by the FRC and its partnering National Societies (NS).

This chapter consists of two main parts. The first part presents the results of the meta-analysis of the ten countries and 17 projects. The meta-analysis utilises the IFRC evaluation criteria (relevance, impact, effectiveness, efficiency, sustainability and coherence). From this sample, the final case studies were selected. The last part is the case study section introducing the findings and results of the field missions to the Philippines. Case study analysis uses a set of systems methods and tools to better understand the dynamics and interconnection between the risk factors and stakeholders in the field. These results will be presented in Chap. 8.3. The systems approach utilised in the case study provides insights about the dynamics and interconnectedness of risk landscapes and inter-organisational Disaster Management (DM) networks. The study shows that by applying systems methods such as network analysis, the risk components helped local disaster risk management units to better understand the interconnectedness of risk elements and the joint impact of those risks. Also, identifying the relations and connections between the disaster risk

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agencies and stakeholders helps to explain why certain risk preparedness actions produce better results and effects. The study concludes that the more actors are connected to the network, the more versatile the understanding of the risk preparedness and thus the higher the resilience of preparedness actions.

## 8.1 Introduction

The interest and need for developing new systemic tools for analysis in the field of disaster risk reduction (DRR) stems from the ever-increasing complexity of systems and the non-linear interdependence between the socio-technical systems and the natural environment in which they function. This chapter introduces an alternative perspective to study disaster preparedness and risk reduction (DP/DRR) systems. The study shows that by applying systems thinking and complexity theory we can better understand the dynamics and interconnectedness of the DP/DRR. This applies both to interconnected risks (multirisk landscapes) and interconnected actors (multi-actor networks).

This chapter is based on the thematic study commissioned by the Finnish Red Cross (FRC) (Uusikylä et al. 2017). The aim of the project was to promote institutional learning on DP/DRR project experiences and practices that can contribute to better programming in the future. The overall objective of the study was to identify critical factors in the way the FRC and its partnering National Societies (NS) are currently designing, implementing and planning for the sustainability of their DP/DRR projects. Specifically, the evaluation was expected to assess the overall impact, effectiveness and sustainability of selected programmes to identify the most common factors related to planning and implementation approaches and practices that have enabled or hindered the programmes to reach their DP/DRR-related goals and objectives in a sustainable manner.

The main emphasis of the study was on learning and development rather than identifying problems or highlighting flaws and failures. Every single project and country programme has its context-specific weaknesses and caveats and the implementation of such programs in a complex environment is challenging. Therefore, one of the main purpose was to find out what programme designs, implementation practices and methods work best in DP/DRR projects.

First, this chapter discusses the DRR strategy of the Red Cross Crescent, where the thematic programme forms the ground for the strategic analysis. Second, it presents the theoretical underpinnings of systemic thinking, complex systems and resilience. Third, the meta-analysis of 10 countries covered in the thematic study commissioned by the FRC is presented. The main focus of this chapter, however, is on the case study of the Community-Based Disaster Risk Reduction (CBDRR) Project in Aklan Province in the Philippines, which is one of the original 10 countries covered in the study. The Philippines is one of the most high-risk countries in the world experiencing natural disasters, and therefore identifying project experi-

ences and practices was crucial in improving the sustainability and resilience of the project. The analysis utilises multirisk analysis, network analysis and outcome harvesting, which are carried out in the case of the Philippines. Finally, the chapter presents conclusions and recommendations for future research.

### *8.1.1 Disaster Risk Reduction Operations Under the Red Cross Crescent Strategy*

According to the International Federation of Red Cross and Red Crescent Societies (IFRC), disaster management can be defined as "*the organisation and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies, in particular preparedness, response and recovery in order to lessen the impact of disasters*". The Red Cross and Red Crescent National Societies, supported by the International Federation, work with communities to reduce risk, mitigate the effects of, prepare to respond, respond to and recover from disasters.[1] During disasters, the immediate aim is to save lives, to reduce suffering, damage and losses and to protect, comfort and support affected people. These actions combined with preventative risk reduction, preparedness and resilience building constitute the core components of the disaster and crisis management work of the Red Cross Movement.

Besides health, DP and DRR are the key thematic areas in the FRC in the long-term programme support it provides for its partnering sister societies under its development cooperation framework. During 2005–2015, the FRC has supported the implementation of around 40 DP/DRR projects and programmes in Latin America, Africa, Central Asia and Asia co-funded by the Ministry for Foreign Affairs of Finland and the European Commission. In addition, the FRC has regularly supported IFRC DP/DRR policy development by funding global DPDRR tools, approaches and programmes. According to the IFRC's disaster management approach, Red Cross seeks to support and build local, community and NS capacities by strengthening household, community and national resilience, reducing disaster risk, ensuring effective and efficient DP and response and facilitating durable and sustainable recovery that goes hand in hand with development.

However, there is a constant concern that the top-down managed programming does not meet the needs on the ground and the current linear tools and methods are insufficient to measure the reality in the implementation countries. As Fiksel (2006: 1) has described it, "there is an urgent need for a better understanding of the dynamic, adaptive behaviour of complex systems and their resilience in the face of disruptions". Therefore, new analytical frameworks need to be introduced that better describe the realities of DP/DRR field and provide better anticipation of unforeseen risks. Viewing the DP/DRR ecosystem through the lens of systems thinking and complexity provides us with new tools and methods of analysis to utilise to

[1] https://www.ifrc.org/en/what-we-do/disaster-management/about-disaster-management/

describe the existing realities. This chapter proposes tools such as outcome harvesting and participatory dialogue and methods such as network analysis and multirisk assessment tools which help to capture the dynamic relationships and emergent behaviours that characterise complex systems.

## 8.2 Complex Systems and Resilience

This chapter proposes systems thinking approach as an alternative to the traditional results-based orientation to planning or evaluating development interventions in complex settings. The chapter identifies disaster management systems essentially as complex adaptive systems in which a group of agents (institutions, donors, NGOs, volunteers, subcontracted service providers, etc.) interact in interdependent ways to produce system-wide patterns, such that those patterns then influence behaviour of the agents.

### *8.2.1 Systems Thinking as the New Paradigm*

Complex Adaptive System can be characterised by "apparently complex behaviors that emerge as a result of often nonlinear spatio-temporal interactions among a large number of component systems at different levels of organization" (Chan 2001: 1). Systems thinking can be defined as a cognitive process of studying and understanding complex systems. There are several definitions available. Richmond (1994) defines systems thinking as the art and science of making reliable inferences about behaviour by developing an increasingly deep understanding of underlying structure. Senge (1990), another leader in the field, defines systems thinking as a discipline for seeing wholes and a framework for seeing interrelationships rather than things, for seeing patterns of change rather than static snapshots. Sweeney and Sterman (2000), authors and researchers in the field of systems thinking, found that much of the art of systems thinking involves the ability to represent and assess dynamic complexity (e.g. behaviour that arises from the interaction of a system's agents over time). They list specific systems thinking skills as including the ability to understand how the behaviour of a system arises from the interaction of its agents over time (i.e. dynamic complexity), discover and represent feedback processes (both positive and negative) hypothesised to underlie observed patterns of system behaviour, identify stock and flow relationships, recognise delays and understand their impact, identify nonlinearities and recognise and challenge the boundaries of mental (and formal) models.

There has been an increasing criticism that the results-based management (RBM) model and logic model approach in evaluation are not sufficient tools for studying or evaluating development interventions in complex settings (see, e.g. Patton 2011;

Ramalingam 2013). Rationalistic (in the meaning synoptic) planning frameworks, which embed the causal logic behind actions (from inputs to outcomes and impacts), have been developed and used extensively, especially in the field of international development aid. Too often, the inflexibility of the logical framework approach (LFA) can limit staff capacity to adapt to emergent trends by holding them accountable to predicted cause and effect, rather than accountable for the ability to learn from the use of rigorous evidence analysis in implementation, and to adapt to changing circumstances and understand the conversion mechanisms that translate inputs into outputs, outcomes and impacts (Virtanen & Uusikylä 2004).

Ben Ramalingam uses in his book "*Aid on the Edge of Chaos*" complexity concepts to reveal the deep reasons and underlying patterns for why development aid either works or not (Ramalingam 2013). In addition, the developmental evaluation (Patton 2011) supports innovation development to guide adaptation to emergent and dynamic realities in complex environments.

Compared to linear logical framework, logic model or results chain approaches, the systems models focus more on transformation mechanisms that translate inputs into outputs and outcomes. Logic model thinking considers the end product to be sum of the actions, whereas systems thinking sees that has emerged as a product of interactions. The LFA treats the process planning and implementation as linear process where A leads to B and B leads to C, etc., whereas in systems approach A can lead to B and C simultaneously and B and C can fire back to A (see Fig. 8.1).

Table 8.1 summarises the differences between LFA and systems thinking. Traditional programme theory and LFA rely on linear programme logic and predetermined and fixed results and outcomes that are constructed as sums of the indi-

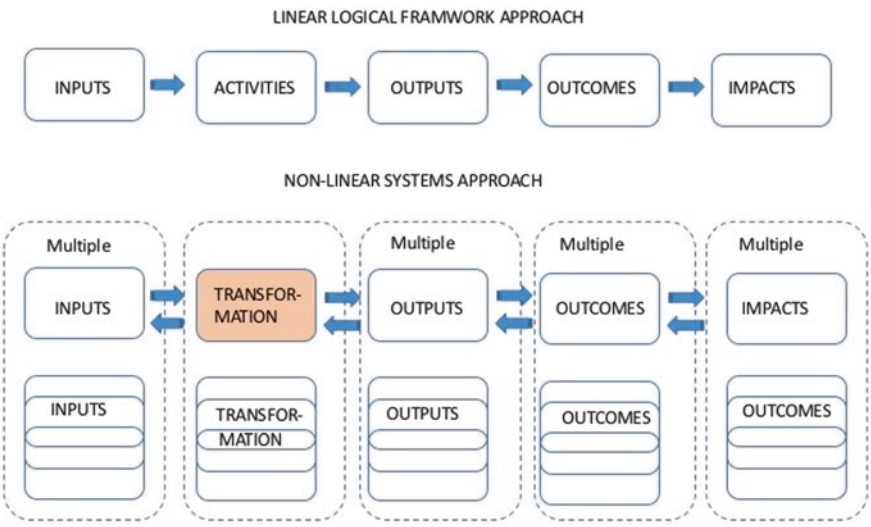


**Fig. 8.1** The intervention logic of the LFA and systems approach

**Table 8.1** Differences between traditional LFA and systems approach (Uusikylä 2019)

| Elements | Logical framework | Systems model |
|---|---|---|
| Intervention logic | Linear | Non-linear |
| Idea on results | Predetermined and fixed | Emerging and changing |
| End product | Sum of the actions | Product of interactions |
| Key actors | Defined stakeholders | Nodes of the network |
| Project manager | Controller and coordinator | Enabler |
| Outcomes | As defined in the project plan | Real-life changes and outcomes |
| Coordination mechanism | Compliance, rules | Learning, trust |
| Success story | Achieving results | Understanding patterns |

vidual actions. Actions are to be coordinated according to predefined project or programme plan. According to the systems approach, social reality comprises interacting parts, which consequently cannot be first treated independently and then simply aggregated to describe the whole as in the analytical micro to macro approach. Systemic approach takes the systems approach even further by analysing not only systems and their subsystem but also potential trajectories emerging from collision of interconnected agents in a policy space (i.e. exploration of the space of possibilities). Interconnectedness and trust are main characteristics of a complex socio-economic system.

### *8.2.2 Disaster Management as Complex Adaptive System*

DP[2] platform can be seen as a complex adaptive system in which a group of agents (institutions, donors, NGOs, volunteers, subcontracted service providers, etc.) interact in interdependent ways to produce system-wide patterns, such that those patterns then influence behaviour of the agents. We can call this nested structure preparedness culture or commonly agreed policy or strategy.

To specify our systemic approach, we should next elaborate our model in the DP/DRR context. As a starting point, we see DP/DRR work not as technical atomistic projects but as an ecosystem. DP ecosystem is formed by community supported by a foundation of interacting organisations and individuals—the organisms of the disaster management system. Inter-organisational networks operate in an open system environment and the system of behaviour is determined by the interactions, not solid isolated components. The dynamics of the system can be understood only by looking at the interactions. DP/DRR networks comprise large number of institutions, organisations and voluntary groups connected through multiple interaction ties. These agents interact dynamically, exchanging information and ideas based upon heuristics that organise the interactions locally. Network relations are very contagious. Even if only few agents interact with one another, the effect spreads and

[2] We use the term disaster preparedness in its broader meaning covering both DP and DRR.

propagates through the system. As a result, the system has a memory that is not located at the specific place, but is distributed through the system (Innes and Booher 2010: 32). This means that even a loosely coupled system can be very effective in getting and spreading new information and knowledge through its weak links (Granovetter 1973). The DP/DRR community produces goods and services of value to beneficiaries, who are themselves members of the ecosystem. This complex ecosystem provides a platform to design effective, realistic and coordinated planning, reduces duplication of efforts and increases the overall effectiveness of National Societies', households' and community members' disaster preparedness and response efforts.

Preparedness ecosystem has many properties that easily create a gap between "preparedness planning" and "preparedness system". Preparedness ecosystem is characterised by the following:

**Emergence** Rather than being planned or controlled, the DP agents in the system interact in apparently random ways. From all these interactions, patterns emerge which informs the behaviour of the agents within the system and the behaviour of the system itself.

**Co-evolution** All systems exist within their own environment and they are also part of that environment. Therefore, as their environment changes, they need to change to ensure best fit. But because they are part of their environment, when they change, they change their environment, and as it has changed they need to change again, and so it goes on as a constant process. That is, communities where DP/DRR work takes place are not static but in a process of constant evolution and change.

**Connectivity** The ways in which the DP agents in a system connect and relate to one another is critical to the survival of the system, because it is from these connections that the patterns are formed and the feedback disseminated. The relationships between the agents are sometimes more important than the agents themselves. This would mean remarkable change of existing *modus operandi* of NS on how to train and build capacity of the DP project staff and volunteers.

**Simple Rules** Complex adaptive systems are not complicated. The emerging patterns may have a rich variety, but like a kaleidoscope the rules governing the function of the system are quite simple. From the DP/DRR point of view, this means only some changes of perception on DP/DRR work.

**Iteration** Small changes in the initial conditions of the system can have significant effects to the system as a whole (often referred to as the butterfly effect). These changes are often spurred by different feedback loops within the organisation. These are likely to have an effect on DRR methods and training.

**Self-organising** In a pure model, there is no hierarchy of command and control in a complex adaptive system. There is no planning or managing, but constant reorganis-

ing takes place to find the best fit with the environment. In the real (organised) world, this naturally is a naïve assumption but it might give some new ideas especially in developing community-based DP/DRR projects.

Figure 8.2 presents our understanding of the DP governance model. The model is based on interlinked and interconnected component both *vertically* (hierarchical levels of governance) and *horizontally* (cooperation or coordination among subsystems). It is important to notice that the IFRC, the NS and their partners play an important role as partners, brokers and supporters both in the field of horizontal and vertical coordination.

In the systems analysis, an intervention and change process makes sensitivity critical in understanding the systems dynamics, that is, actors' values, interests, choices and inter-linkages and interdependencies. DP/DRR environment (context) can be treated as a dynamic field that fluctuates rather than being static. No system is constantly in a simple and static state nor does it operate in a continuous complexity or chaos. Even a minor change in systems dynamics can have dramatic impacts on the system as a whole. In systems language, this is called bifurcation. Bifurcation occurs when a small smooth change made to the parameter values (the bifurcation parameters) of a system causes a sudden qualitative or topological change in its behaviour. For example, a shift in power relations or exit of an important DP/DRR actor could cause major changes in the DM network.

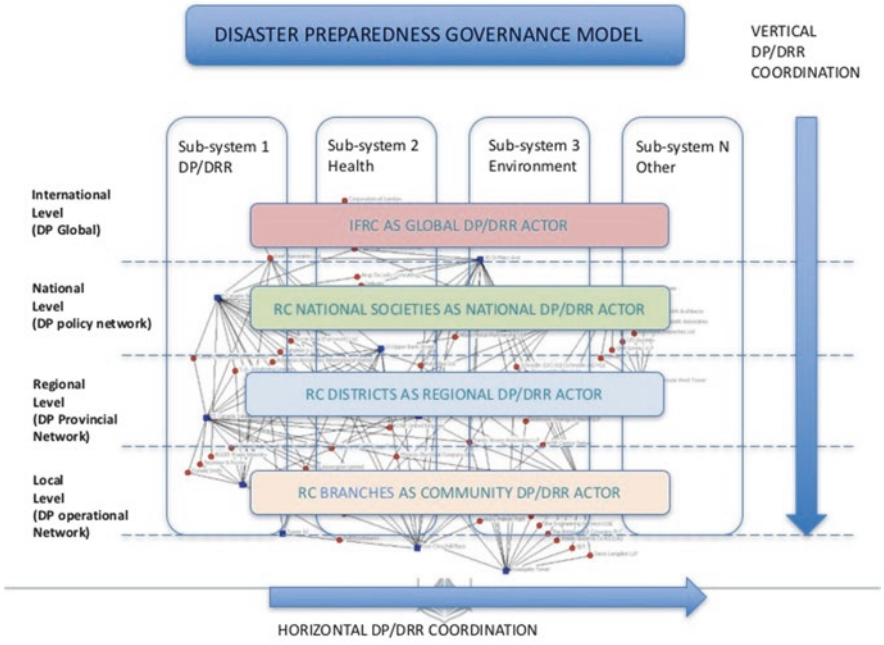


**Fig. 8.2** DP governance model

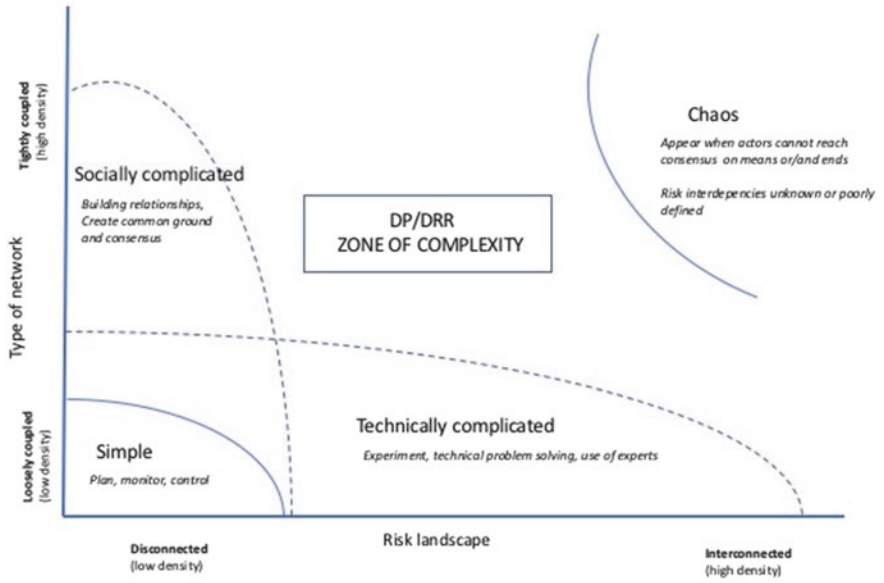


**Fig. 8.3** DP/DRR environment as a zone of complexity (adapted and modified from Patton 2011)

Homeostasis on the other hand is the property of a system in which a variable is actively regulated to remain very nearly constant. In DP/DRR system, the highly regulated environment or strong position of powerful institutions normally stabilises the system and thus brings it back to the state of homeostasis. Normally, system displays both capacity to maintain its viability and capacity to evolve. With sufficient diversity, the agents will adapt to each other, and the system can reorganise its internal structure without outside agents involvement. It is important to remember that the system is open, the behaviour of the system is determined by interactions and the behaviour of the system cannot be understood by looking at the components. Instead, it can be only understood by looking at the interactions.

Figure 8.3 presents our analytical framework when analysing the DP/DRR networks from a systems perspective. Horizontal axis describes the risk landscapes where risks can be isolated or highly interconnected and vertical axis illustrates the network types, that is, whether a network is loosely coupled (low density) or tightly coupled (high density). We operationalise these by calculating the risk and stakeholder network density[3] and centralisation[4] scores for each case study networks. This leads to the following expectations (working hypotheses):

[3] Density is the measurement of network cohesion. The density ($D$) of a network is defined as a ratio of the number of edges ($E$) to the number of possible edges. We apply valued data so density is defined as the average strength of ties across all possible (not all actual) ties. Where the data are symmetric or undirected, density is calculated relative to the number of unique pairs ($(n*n-1)/2$).

[4] The concept of point centrality originates in the sociometric concept of the star. A central point was one which was at the center of a number of connections, a point with a great many direct

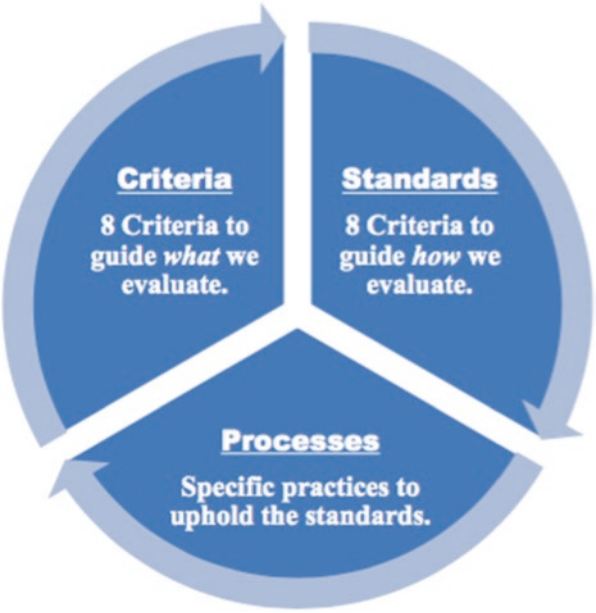


**Fig. 8.4** The IFRC Evaluation Framework

1. The higher the risk density, the more complex the risk environment.
2. The higher the risk centralisation, the more dependent are other risk factors on root cause.
3. The higher the stakeholder network density, the more connected and interdependent the actors are (sometimes it can also be an indicator of high trust).
4. The higher the centralisation, the more dependent the actors are on one or few powerful agents.

There are four spheres of complexity in Fig. 8.4. Simple environment is the one where risks are disconnected and actors are operating in loosely coupled network. Socially complicated sphere is the one where actors are highly interconnected but risks are disconnected. In the technically complicated sphere, actors are loosely connected but risks are highly interconnected. Zone of complexity exists in a situation where both actors and risks are highly interconnected. Simple problems (such as implementing training or drill according to a manual) may encompass some basic issues of technique and terminology, but once these are mastered, following the recipe carries with it a very high assurance of success. Complicated problems (like building a water sanitation system) are different. Their complicated nature is often related not only to the scale of the problem but also to their increased requirements

contacts with other points. The simplest and most straightforward way to measure point centrality, therefore, is by the degrees of the various points in the graph. Tie degree, it will be recalled, is simply the number of other points to which a point is adjacent.

around coordination or specialised expertise. In contrast, complex systems are based on relationships, and their properties of self-organisation, interconnections and evolution.

On the far ends of the complexity, we enter the zone of chaos. In that zone, there is intense conflict among key stakeholders and extreme uncertainty about the risk landscape and lack of understanding and knowledge on how to achieve the desired outcomes. There is no clear dividing line between complexity and chaos. According to Patton (Patton 2011: 93), "it is a matter of degree that has to do with how rapidly things are changing and the extent to which reverberations, ripple effects and turbulent interactions are multiplying and cascading". In the state of chaos, things are uncontrollable and unpredictable.

### *8.2.3 Resilience in Complex Adaptive Systems*

Resilience building constitutes as the core component of the DPDRR work of the Red Cross Movement and as a term has been widely used in the DRR literature. Resilience has in fact become a buzzword and has obtained diverse meanings in different academic disciplines (Bahadur et al. 2010). There has been a concern that resilience "may collapse into meaninglessness that results from having too many meanings" (Lundberg and Johansson 2015: 2). The difficulty in conceptualisation of resilience lies in the varying views on whether the "system" is considered as "constant, stable and/or has the capacity to adapt" (Bosher 2014: 4). Bosher (2014) has categorised the different definitions of resilience into four categories: resistance/robustness, recovery/"bouncing back", planning/preparing/protecting and adaptive capacity. This confusion has led to the difficulty in conceptualising resilience and subsequently measuring it. There is also divergence in whether resilience is being used to describe outcomes or processes leading to outcomes. Here, resilience is conceptualised in the framework of systems thinking fitting to the characteristics of complex adaptive systems such as DP platforms.

In this chapter, resilience is defined following Manyena (2006) and Holling (1973) emphasising its processual nature as well as the persistence of relationships within a non-equilibrium system. According to Manyena (2006), resilience is understood as a process, comprising "series of events, actions or changes to augment the capacity of the affected community when confronted with singular, multiple or unique shocks and stresses". "…Resilience does not deal with regularities …but rather, it is an art that addresses singularities as we experience them" (Weinberg 1985 in Manyena 2006). Understanding resilience as a process is central to systems thinking approach as the inflexibility of the traditional results-based approach can limit capacity to adapt to emergent trends by being accountable to predicted cause and effect rather than accountable for the ability to learn from evidence analysis in implementation and to adapt to changing circumstances. According to Manyena (2006), in the current usage of the term resilience in the field of DRR, there is a risk that it is being used too extensively to describe the quality of end results of disaster

DRR interventions. "The danger of viewing disaster resilience as an outcome is the tendency to reinforce the traditional practice of disaster management, which takes a reactive stance" (McEntire et al. 2002 in Manyena 2006). This has the possibility to skew activities towards following "supply rather than demand", neglecting activities such as emergency preparedness planning and community capacity building (Manyena 2006). Manyena (2006) also emphasises as part of the process-oriented resilience the importance of local knowledge and culture in forming resilient DRR strategies (Bahadur et al. 2010). This is supportive of a bottom-up approach unlike the top-down mechanism embedded in the traditional results-based log-frame thinking. In the case of the Philippines, the bottom-up approach was successfully utilised as the local stakeholders were included in the process from early on.

"The theory of complex dynamic systems describes the periodic, rhythmic dance between order and chaos, between stability and transformation as a fundamental pattern of self-organization in complex (living) systems" (Wahl 2017). Holling (1973: 17) draws his understanding of resilience from the fundamental nature of this thought, characterising ecological systems "by two distinct properties: resilience and stability". DRR programmes can be seen as complex adaptive systems and "systems-of-systems", part of the bigger surrounding ecology subordinate to the characteristics of self-organisation and non-linearity. Holling (1973: 17) defines resilience as "the persistence of relationships within a system and … the ability of these systems to absorb changes of state variables, driving variables and parameters and still persist". Holling (1973: 17) sees resilience as a "property of the system and persistence or probability of extinction is the result and stability the ability of the system to return to an equilibrium state after temporary disturbance". This approach is necessary as the DP platforms are understood as complex adaptive system in which a group of actors interact in interdependent ways. Holling's understanding of resilience stems from the view of "natural systems as dynamic and being away from an 'equilibrium' or stable state at any point, instead being organised in a domain of attraction in which different elements of a system are organised around different, individual equilibriums" (Bahadur et al. 2010: 7). Following the logic of systems thinking, Holling understands ecological systems essentially as non-linear, which human actions inherently make even more unpredictable. Ecological resilience therefore emphasises the adaptive capacity of systems, which may lead to new equilibria (Carpenter et al. 2001 in Fiksel 2006). However, these fluctuations can improve resilience instead of harm it. While some elements in the system might be changed due to the disturbance, "the system will persist if the nature of the relationships between these elements broadly remains the same" (Bahadur et al. 2010: 7).

## 8.3 Meta-Analysis

This chapter presents data, methods and results of the meta-analysis covering ten countries and 17 projects covered in the thematic study commissioned by the FRC. The country/project selection is introduced first, followed by describing the differences

between meta-evaluation and meta-analysis (focus mainly on meta-analysis but some observation on the quality and accuracy of the evaluation reports is also reported). Finally, the results of the meta-analysis are presented by comparing eight IFRC evaluation criteria and the ten country cases.

### *8.3.1 Data and Methods*

Thematic programme level forms the ground for a strategic analysis. It starts with the main goals and objectives of the DP/DRR activities set by IFRC, FRC, NS and other donors or co-founders (e.g. ECHO). The aggregation of empirical results from the various project levels analyses feedback to programme level and is supposed to give answer to the questions such as: Are the goals and objectives valid, realistic and relevant vis-á-vis the problems and needs? Should they be changed or fine-tuned? What revisions need to be made at the programme level?

The basic assessment criteria included geographical regions, focus areas, donors and time spans of the projects. The criteria were complemented with more dynamic evidence from the experience and the tacit knowledge of the FRC experts in mapping workshop participated by seven FRC staff members and facilitated by the consultants (Table 8.2).

**Table 8.2** Project assessment criteria

| Criteria | Variables |
|---|---|
| Geographical region | South America/Caribbean/Central Asia and Caucasus/Asia |
| Funding agencies | ECHO/MFA/FRC or others |
| Number of implementing agencies | 2 (FRC and NS)/consortium |
| Preparedness emphasis | Community preparedness/institutional preparedness/both in equal shares/other |
| Multiple phases | Yes/no |
| National society's institutional position in national preparedness systems in the beginning of the project | Strong position/have a position but could have a stronger one/no official position, aspire to have one |
| National society's potential (assumed) interest in learning from the DP study | Strong interest assumed/intermediate interest/no interest/no information |
| Variance in project's multirisk approach | Only natural disaster risks considered/only man-made risks considered/different kinds of risks considered (natural and man-made) |

### *8.3.2 Concept of Meta-Analysis*

Meta-analyses are often, but not always, important components of a systematic review procedure. For instance, meta-analysis may be conducted on several DP/DRR reports and evaluations in an effort to obtain a better understanding of how successfully projects have been implemented and what are the main results and impact of these projects. In this study, meta-analysis is used as a practical inquiry to combine evidence and lessons learned to have an overall understanding of the DP/DRR programme planning, implementation and M&E dynamics.

Meta-analysis refers to a synthesis of existing programme evaluation studies in a given area and aims to summarise the current knowledge about a particular type of programme and analytical synthesis of evaluation findings, outcomes and lessons learned. The study followed the logic of IFRC Evaluation Framework (IFRC 2011). The purpose of this IFRC Framework for Evaluation is to guide how evaluations are planned, managed, conducted and utilised by the secretariat of the IFRC. The framework is designed to promote reliable, useful, ethical evaluations that contribute to organisational learning, accountability and the mission to best serve those in need.

Both IFRC and MFA evaluation criteria are applied as an analytical framework for carrying out the meta-analysis (see IFRC 2011: 17). The evaluation criteria applied here (six out of eight) are:

**Relevance and appropriateness.** The extent that the IFRC's work is suited to the needs and priorities of the target group and complements work from other actors.

**Impact.** The extent that the IFRC's work affects positive and negative changes on stakeholders, directly or indirectly, intended or unintended.

**Effectiveness.** The extent that the IFRC's programmes meet their targets set and produce positive results.

**Efficiency.** The extent that the IFRC's work is cost-effective and timely.

**Sustainability and connectedness.** The extent the benefits of the IFRC's work are likely to continue once the IFRC's role is completed.

**Coherence.** The extent that the IFRC's work is consistent with relevant policies (e.g. humanitarian, security, trade, military and development) and takes adequate account of humanitarian and human-rights considerations.

These criteria are used to draft the meta-analysis framework. Also the eight IFRC evaluation standards (utility, feasibility, ethics and legality, impartiality and independence, transparency, accuracy, participation and collaboration) were taken into account although they were used only implicitly. In the meta-analysis framework, the first column presents the criteria described earlier. The second column consists of the list of critical research questions to operationalise the criteria. After that, each project is rated according to each criterion by applying the applied MFA rating scales, where:

1 = criteria mostly not fulfilled or totally absent
2 = criteria partially fulfilled
3 = criteria nearly fulfilled

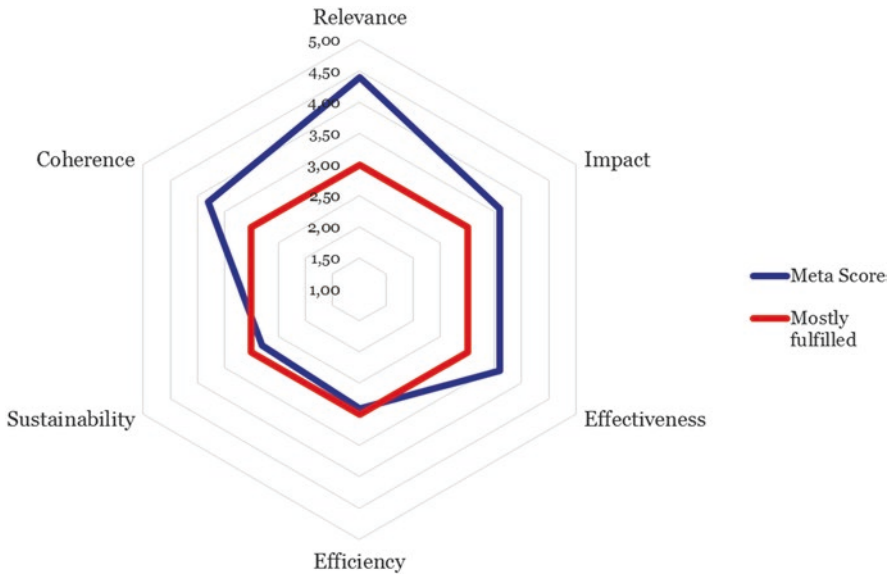


**Fig. 8.5** The average scores of the DP/DRR meta-analysis according to the IFRC criteria

4 = criteria entirely fulfilled
5 = criteria entirely fulfilled in a clear and original way
n/a = not addressed

### *8.3.3 Results of the Meta-Analysis*

In comparative terms, the overall result of the DP/DRR programme or project meta-analysis is rather positive.[5] Figure 8.5 shows that all criteria reach at the average (score 3) and most are above it. **Relevance** (4.40) and **coherence** (3.80) are rated as highest factors. This clearly proves that the FRC's DP/DRR projects are suited to the needs and priorities of the target group and complement work from other actors. High coherence indicates that FRC's projects are consistent with relevant policies (e.g. humanitarian, security, trade, military and development as well as national strategies and government policies) and take adequately into account humanitarian and human rights considerations. More generally, success in both of these areas also indicates that strategic planning and alignment during the pre-programing phase has been appropriate and well done.

The second layer consists of two criteria that are both above average score, that is, **impact** (avg. = 3.60) and **effectiveness** (avg. = 3.60). Positive impact score

[5] With the comparative aspect, other meta-analyses are referred to carry out during the last 3 years. This is a naturally very subjective statement and should be treated as one.

suggests that FRC's work affects positive changes on stakeholders, directly or indirectly, intended or unintended. Positive effectiveness score tells that FRC's projects have mostly achieved or are likely to achieve their intended, immediate results and long-term impacts. In most of the evaluation reports, the impact of a project is analysed in the phase were project has just ended or is running during the evaluation. Therefore, the impact usually is more of an expected impact or a perception of the stakeholders.

**Efficiency** (avg. = 2.90) and **sustainability** (avg. = 2.80) requirements are only nearly fulfilled in the FRC's DP/DRR projects. Both criteria score below average value of 3 which are the lowest overall scores. This still indicates that in future projects FRC should pay more attention to efficiency (i.e. cost-efficiency, cost-effectiveness and timeliness of the implementation) and especially to sustainability. As far as efficiency is concerned, several programmes have had a slow start, which made management costs seem proportionally high. In addition, in some cases, inefficiencies were beyond the influence of the programme/project, since it was mostly due to partner government processes. Relatively low sustainability score can be explained by high external support or donor dependency, which means that after the project ends, the activities (e.g. trainings, drills, capacity building) are likely not to continue. In some cases, one programme cycle (in some cases only 1 year) was seen as too short for setting ground for an appropriate level of sustainability. In some of the cases, the next project phase would have been needed to ensure sustainability.

**Coherence** scores of the projects analysed were also rather high (avg. = 3.80). This indicates that projects have been consistent with relevant policies and have taken adequate account of humanitarian and human-rights considerations.

Considering the results per country, the Philippines achieved the highest scores (Fig. 8.6). In both cases, the projects were strategically well aligned, accurately planned and well implemented. Also, monitoring and evaluation reports in these

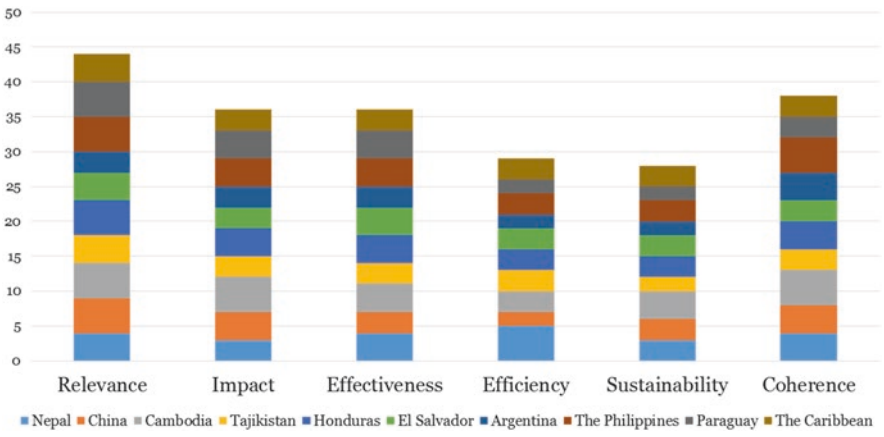


**Fig. 8.6** Results of the meta-analysis on selected DP/DRR projects aggregated to country level

two country cases were sound, clear and well written (in meta-analysis, this could cause a minor positive bias).

Still, the overall conclusion drawn from the country comparison is that the differences between the eight case study countries according to the six IFRC criteria are not that remarkable. There is some minor variation (e.g. low efficiency in Argentina and China, high impact in Cambodia or low sustainability in Tajikistan) but differences are not vast. The scoring depended also highly on the quality and accuracy of the evaluation reports. If the evaluation criteria were not applied appropriately, it was extremely difficult to get the relevant information for meta-analysis and scoring.

## 8.4 Case Study: DP/DRR Programmes in the Philippines

The Philippines is one of the most high-risk countries in the world for experiencing natural disasters. The list of possible natural disasters includes earthquakes, floods, mudslides, typhoons and volcanic eruptions. The Philippines is considered to be one of the most storm-exposed countries on Earth. On average, 18 to 20 tropical storms enter Philippine waters each year, with 8 or 9 of those storms making landfall. It has been estimated that the extensive risk, accounting to 2/3 of all losses in the Philippines, is mainly associated with flash floods and droughts. According to Hatakka and Gogcio (2016), disaster trends for the Philippines show that the impacts of disasters are increasing, not only by total number of people affected, but also by the impacts of disaster trends by estimated damage. Demographic growth and urbanisation have also affected the provision of basic services resulting in deteriorating solid waste management and aggravating flooding in urban areas for the past years. Economic vulnerabilities manifest these, as for instance, when poor households lack the assets or resources to repair, rebuild or replant their livelihoods, or workers in informal employment with no access to social safety nets face immediate or ongoing loss of incomes.

### *8.4.1 DP/DRR Policy Framework in the Philippines*

Policy and legal frameworks have been established and guided by international treaties such as the Hyogo Framework for Action (HFA) and the ASEAN Agreement on Disaster Management and Emergency Response (AADMER) as well as the Sendai Framework for Disaster Risk Reduction. Based on those treaties, the Government of the Philippines has introduced the Philippines Strategic National Action Plan for Disaster Risk Reduction 2009–2019 (SNAP). At the national level, the Disaster Risk Reduction (DRR) Management Act of 2010 (RA 10210), also referred to as "DRR Law", aims at building resilience of local communities to disasters, including climate change impacts. The DRR Law mandated the Department of Interior and Local Government (DILG), which is also the vice-chair of the Preparedness Committee of

the National Disaster Risk Reduction and Management Council (NDRRMC), to take the lead on DP and build capacities in the local government units (LGUs) and to integrate DRR and climate change adaptation (CCA) in development planning. The Philippine Red Cross (PRC) is the only non-governmental member of the NDRRMC and is therefore uniquely positioned to support the implementation of RA 10210. The PRC, by virtue of RA 10072, is an independent, autonomous, non-governmental organisation auxiliary to the authorities of the Republic of the Philippines in the humanitarian field. It offers a range of programmes on blood services, disaster management services (DMS), safety services, health services, social services, Red Cross Youth and volunteer services targeted to the most vulnerable population. At present, the PRC Headquarters has around 400 staff including the directors and managers and a total of 102 chapters and subchapters manned by a total of approximately 1500 staff composed of chapter administrators and technical personnel supported by thousands of volunteers located across major cities and provinces in the country (Hatakka & Gogcio 2016).

### *8.4.2 Community-Based Disaster Risk Reduction Project in Aklan Province*

The CBDRR Project in Aklan Province started from April 2011 until December 2012. Project planning for the 2013–2015 took place during January to February 2013 for assessment and preparation. The new cycle of CBDRR Project was extended in Aklan Province while sustaining activities in 5 "existing" project areas (community and schools) until 2014 and adding 5 "new" project areas until 2015. Likewise, the CBDRR Project expanded to an urban environment—Caloocan City wherein 5 project areas were selected in January 2013. The design of the project remained to adhere to the PRC Disaster Risk Reduction and Management (DRRM) framework and at the same time applying new CBDRR approaches such as improved Red Cross 143 (RC143) volunteer programme, inclusive programming of thematic issues and health integration to DRR. As the programme was implemented by DMS, the CBDRR project also seeks to contribute to the PRC DMS strategic plan 2012–2016 most particularly in contributing to the development of a safe and disaster resilient community and schools and capacity building of PRC.

The CBDRR project aimed to improve the capacity of targeted communities and institutions to better prepare for and reduce disaster risks. The direct beneficiaries are the people living in targeted barangays of Aklan and Caloocan. The project activities in the barangays are divided in four categories and closely interlinked components. RC143 established in all barangays trained and mobilised communities in DRR activities and developed barangay disaster actions plan (BDAP) and sustainable small-scale mitigation measures. School-based DRR increased knowledge on hazards, climate change and DRR and response in case of disasters. The project also aimed to strengthen organisational links of chapter-level PRC with

municipal and provincial levels and to strengthen coordination and cooperation among the stakeholders in DM. It was also targeted to capacity building of NHQ, Aklan Chapter and Caloocan Chapter of PRC for Project and Financial Management.

The project's principal and specific objectives according to its log frame is "to increase safety and resilience of targeted communities in disasters" and "to improve the capacity of targeted communities and institutions to better prepare for and reduce disaster risks", respectively. The thrust of PRC in achieving these objectives is to organise a network of RC143 volunteers who will assist the community and school to prepare for disasters and respond rapidly in emergencies. Multiple capacity building and mobilisation activities were organised and implemented for the RC143 volunteers such as trainings, equipping, assessment, planning sessions, awareness campaigns and small-scale mitigation measures. The relevance of the RC143 volunteers is recognised by local officials due to its limitation in manpower and resources to organise and capacitate them. Retaining the activeness of trained RC143 volunteers was a major challenge in view of their livelihood activities or academic obligations and few instances of personal differences with local officials; however, it is advocated to the chapter and local officials to exert efforts in mobilising them in its different activities whenever possible. Beyond the capacity building for RC143 volunteers, community residents and school pupils were also engaged in the project through their participation in assessment activities, awareness campaigns, evaluation (midterm and final) and surveys (baseline and end line).

Prior to the project, there has been limited involvement of residents in DRRM implementation. However, they are often perceived as receivers, not co-implementers. There is, however, consultation of communities and pupils in assessing their locality's vulnerabilities and capacities to prioritised hazard and larger number of participants in simulation exercises. Various awareness campaigns facilitated by RC143 volunteers were organised for and participated by residents and pupils; however, the efforts were not sufficient to influence significant change in knowledge and attitude.

The final Annual Report of 2015 (extended to Spring 2016) gives a very positive overall assessment of the results of the Philippines Programme. The report states that the CBDRR project contributed to DMS achievement of its share in the Goal 1, Objective 1 of the PRC Strategic Plan 2012–2016 which is "to develop resilience in communities vulnerable to disasters and public health emergencies through a sustainable community-based preparedness and response plan". It continues that "the CBDRR project to the chapters is its increased capacity to manage DRR projects and improvement of its image as a development partner and not only as an organisation that provides relief aid and safe blood. The project also strengthened the capacity of the chapter in emergency response through volunteer training and minor equipping, and in daily office operations through the purchasing of equipment, office furniture and vehicle used by the chapter during and after project's duration". The Final Evaluation (May 11, 2016) was a bit more critical and lists also several recommendations to further enhance the DP/DRR awareness, capacity and activities in Caloocan City and Aklan Province.

### *8.4.3 Multirisk Analysis*

During the field mission to Aklan and Caloocan City on November 14–19, 2016, PRC staff (HQ, chapters and volunteers) were interviewed together with main stakeholders and beneficiaries (52 total). Assessment of the main risks related to both communities was one of the interview topics. Instead of repeating the risk part of the vulnerability and capacity assessment (VCA), a more comprehensive systems approach to risk identification and analysis was introduced. This approach was warmly welcomed by the participants of the risk assessment workshops in Caloocan City and Kalibo (Aklan). In their opinion, VCA process is helpful in identifying the main risks that are more or less known a priori. Risk definition should be broadened to cover also political, economic, health-related, social, technological and cultural risks. Secondly, risks should not be seen as independent or atomistic phenomena but tightly interlinked web of risk patterns (WEF 2014). In this case, the risk assessment framework of the World Economic Forum (see, e.g. WEF 2014) was applied. In addition to natural disaster, the so-called systemic risks that have sometimes explanatory power when explaining human behaviour in critical disaster environments were also included. Systemic risk is the risk of "breakdowns in an entire system, as opposed to breakdowns in individual parts and components" (Kaufman and Scott 2003). Systemic risks can be characterised as follows (WEF 2014):

- modest tipping points combining indirectly to produce large failures
- risk-sharing or contagion, as one loss triggers a chain of others
- "hysteresis", or systems being unable to recover equilibrium after a shock

According to the CBDRR Project 2015 Annual Report, the planning process in Caloocan City remained to be difficult. Only one community was able to complete their barangay DRRM 2015 plan; however, a copy could still not be secured from the community or city, and only 2 communities (12 and 176) were able to finalise their contingency plan (these were also the barangays that participated in workshops).

Three most critical risks were identified as: (1) floods, (2) earthquakes and (3) fire. Given the urban context, these are also the most dangerous for the inhabitants and livelihoods in the area. However, when mitigation measures are considered, it is not sufficient to tackle these risk factors separately. Most of the risks listed earlier are highly interconnected and therefore also mitigation measures, drills and evacuation plans should be planned from the multirisk perspective.

In Fig. 8.7, the numerous and complex interconnections between risks can create consequences that are disproportionate and difficult to contain or predict. The Risks Interconnections Map (RIM) seeks to connect the dots by identifying and visualising the underlying patterns. This allows for a better understanding of the impact of systemic risks so as to mitigate them by identifying the transmission channels between risks and potential second- and third-order effects. These interconnections do not represent direct causality. They are likely to be indirect, for example, through parallel impacts or mitigation trade-offs.

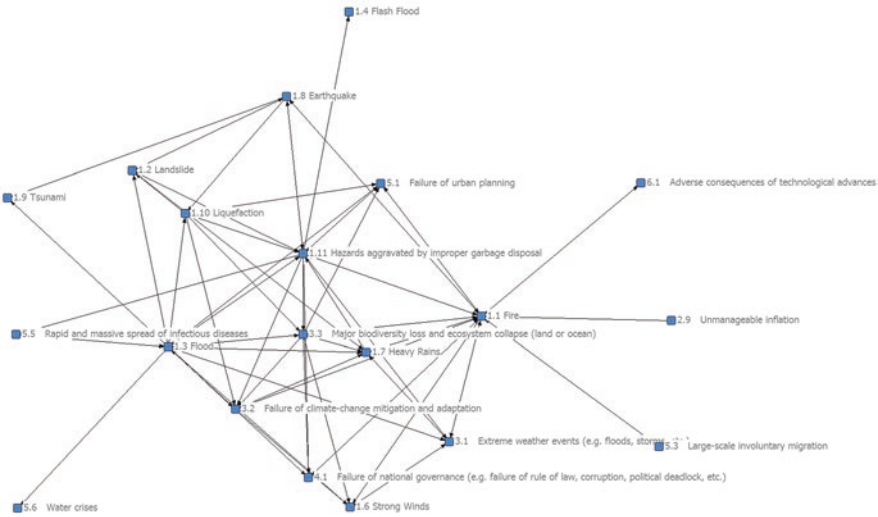


**Fig. 8.7** Caloocan multirisk map of interconnectedness

The RIM shows how all global risks are connected to others and underlines the complexity of dealing with global risk in an effective manner. The map visualises the strength of connection between individual risks—the most strongly connected risks could merit additional attention due to the multiple ways they affect or are affected by other risks.

Interestingly, hazards aggravated by improper garbage disposal (listed as No. 4 in prominence) together with fire (No. 2) and major biodiversity loss and ecosystem collapse (No. 10), seem to be the most centrally positioned risk factors that bridge several other risk areas. These risks together with failure of the national governance are not typically listed in VCAs or other risk assessment exercises. During the focus groups discussions, many participants announced that when they carry out risk assessments next time, they are willing to apply a broader, systemic multirisk approach. This also indicates that there should be special risk identification maps and mitigation measures for urban DP/DRR projects.

The systemic multirisk mapping widened the risk landscape both in Aklan (multirisk map presented in Annex) and in Caloocan City. It showed that risks such as failures in urban planning and infrastructure are directly connected phenomena with hazards aggravated by improper garbage disposal and liquefaction. Likewise, failure of national governance directly increases major biodiversity loss and failures of climate change mitigations. When planning a future urban DRR project, these second layer risk factor should be embedded into the overall risk landscape and taken into consideration when planning project activities.

### *8.4.4 Inter-organisational DM Networks*

In the complex world, relations (collaborative and competitive) between individuals and organisations need to be given a special attention. The introduction of general systems theory into discussions of management theory by Johnson et al. (1964) served as a stimulus, and a way forward, for those seeking to explore relations between organisations. They described systems theory as a way of integrating diverse internal and external factors that managers faced. In their view, systems theory also helped managers to cope with the complex nature of these factors. There are two dimensions across which organisations can be related. They can have interactive relationships, for instance, in the exchange of information or resources, or noninteractive relationships when they share particular attributes—such as status, identity, cognitive structures, strategic positioning or core technology—that induce the same behavioural stimuli in related members and/or expose the organisations to the same evolutionary forces (see, e.g. Gharajedaghi 2011; Holland 2014). Here, the focus is on direct interactions between the organisations and group of actors in Caloocan and Aklan DP/DRR networks.

During the workshops and interviews, the participants were first asked to list the most important/prominent organisations and groups in their local DP/DRR networks. Participants were given the list of organisations and they could add additional organisations to this list. This produced a traditional stakeholder mapping (refer to the Caloocan and Aklan stakeholder prominence scores).

Stakeholders were asked to list and rate the most influential DP/DRR groups and organisations in their area. According to these ratings, the most prominent actors in the Caloocan list consist of government organisations or service agencies (barangay LGUs, schools, the DRRM Office and the Division Office) with PRC Chapter being ranked 5, followed by Bureau of Fire Protection and DILG. In Aklan, the two most prominent organisations or groups were PRC Chapter and barangay residents and after LGUs again the 143 members of PRC and the volunteers.

After listing all the relevant stakeholders related to DP/DRR activities in Caloocan City and Aklan, the respondents were given a matrix (with additional stakeholders included) and asked to define the relationships between all actors (organisations and groups) in the matrix. Individual Excel matrices were thereafter aggregated (mean) to form a synthesis matrix containing all the responses. This matrix was then copied to UCINET programme for network analysis and mapping. Figure 8.8 show the overall structure of the inter-organisational DP/DRR networks in Caloocan and Aklan.

The two networks (Aklan Province and Caloocan City) were found to be very dense and highly interconnected. In practice, this means that all organisations and groups can reach each other at least through paths (i.e. via brokerage). Strong government-driven culture in Caloocan can be seen by analysing the organisations that occupy central positions in the middle of the networks. This brokerage position increases their power in resource and information sharing. The EuropeAid project states in its 2015 Annual Report that “close and formal links with the DILG and

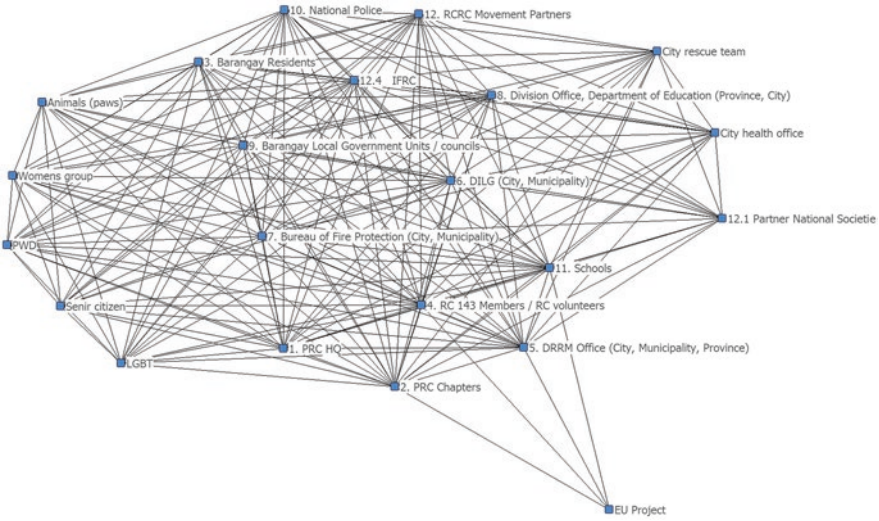


**Fig. 8.8** Inter-organisational DP/DRR network in Caloocan City

LGUs have not been established, risking that they are not very much interested in the products of the project". The project sees the LGUs as target for the envisaged advocacy activities, instead of considering them as partners or allies working for the same cause. The opportunities for influencing local planning were found very limited. In addition, during the field mission, it was clearly seen that barangays that received funding from the projects were not willing to disseminate the knowledge gained to other barangays (winner takes it all). This is not a very positive cultural mode from the sustainability perspective.

Network analysis of the Aklan and Caloocan City stakeholders showed that there were many groups or agencies that were rather actively participating in the implementation of the project without having formal status in the CBDRR project framework. In Aklan network, other NGOs (e.g. World Vision), charities and associations (Rotary Club) and especially the Catholic Church and companies were considered to be important actors in DP/DRR work. In Caloocan, the role of the citizen groups (women groups, senior citizens) and healthcare agencies was more important than expected in project plans. These groups provide additional resource that gives the CBDRR project more opportunities and are likely to increase resilience in the area.

The roles of different collective actor groups in the DM networks will be discussed next[6]. Although, we have argued that DM networks are self-organising social systems which manifest certain characteristic that may retain even if all its individual members are replaced (see Laszlo 1972), each actor occupies a certain structural

[6] Network data was aggregated by coding each actor into a collective actor group. The adjacency matrix was partitioned into submatrices by computing the average scores for each subgroup. This data was thereafter used as $N \times N$ network matrix.

position in a network that either constrain or enable actors to pursue their goals and ambitions. Consider the dynamics of the diffusion of new ideas or information in a network. Central individuals, organisations or groups embedded in a system of strong ties not only have a high potential for transmitting ideas but also can send messages to those who share those ideas and practices (Kadushin 2012: 145). To analyse the network positions of various collective DM actors, we use two indicators to measure their influence. First is Freeman's centrality index, which measures the number of direct ties that an actor has to other members of the network. The score we have calculated from the case study DM networks is the betweenness centrality.[7] A practical interpretation for the betweenness centrality is the position of a brokerage. An actor with high betweenness centrality links groups that might otherwise not be connected. The less constrained broker or organisation that bridges structural holes (Burt 2005) can be a very effective opinion leader. This gives four DM roles in a DP/DRR network:

1. **Power brokers** are DM actors that have *high brokerage* position but a *low centrality*. These actors normally build bridges between agents in a network. Their position could also be characterised as an enabler, that is, an agent that provides possibilities, opportunities and contacts to other members of the network but does not actively play a leading role.
2. **Support agents** are DM network members that have both *low centrality* and *low betweenness* scores. These agents typically have certain restricted or limited responsibilities or very specified tasks in a network.
3. **Guardians** are well connected (*high centrality*) but do not occupy strategically central positions connecting other members of the network (*low betweenness*). In DM networks, this means that network members are not dependent on guardians but still frequently interact with them.
4. **Game changers** are the most influential actors in a DM network. Game changers have vast amount contacts with other network member (*high centrality*) and occupy strategically critical positions that give them an opportunity channel information and other resources (*high betweenness*). Game changers are agents that can change an existing situation or activity in a significant way. On the contrary, they can also block a change they are not willing to support (Fig. 8.9).

The Philippines DM network is led by the RC Chapters, network of RC 143 volunteers and schools that play an important role in the implementation of the DP/DRR projects and activities. Quantitative network analysis formalises and supports the qualitative information and observation gathered during the Caloocan and Aklan field mission. The capacity of PRC is extremely high and its projects are well pre-

[7] Degree centrality can be defined as the number of links incident upon a node (i.e. the number of ties that a node has). Betweenness centrality quantifies the number of times a node acts as a bridge along the shortest path between two other nodes. It was introduced as a measure for quantifying the control of a human on the communication between other humans in a social network by Linton Freeman (see more in Freeman 1979 or Johanson et al. 1995).

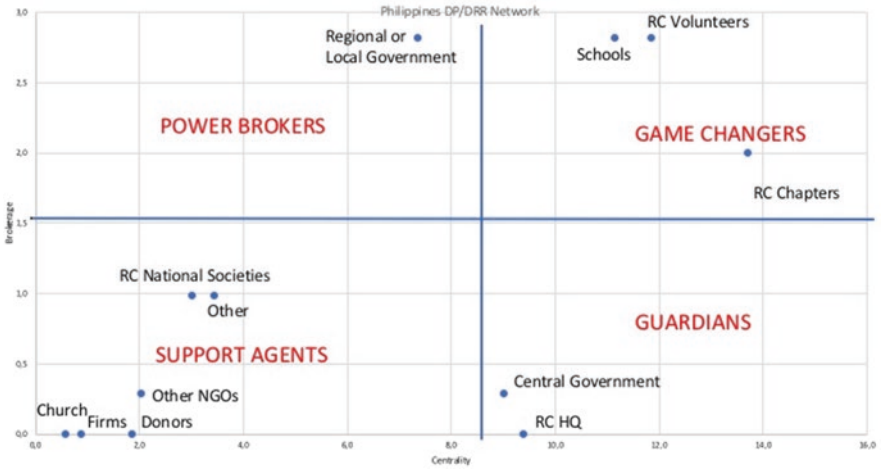


**Fig. 8.9** Collective actors' roles in the Philippines DM network

pared and implemented. This is one of the main reasons and explanations for the strong position of the RC actors in the DM network. The role of the Philippines Red Cross Head Quarter (HQ) is more of a guardian (together with the central government). The HQ mobilises the resources needed for DP/DRR activities, is in close contact with the central government (advocacy) and steers the activities from the arm's length. Regional and local government actors are typical power broker. They enable DP/DRR activities and connect various actors in the field. Support agents group in the Philippines consists of organisations such RC NS, NGOs, firms, the Church and other donor organisations. All these agents have a limited scope for their actions and carry out specific tasks in the DM network.

### *8.4.5 Outcome Harvesting*

One of the problems with LFA-driven approaches is that they steer focus too narrowly on the programme/project outputs and outcomes and easily neglect other important changes, results and outcomes. Outcome harvesting is a method that enables evaluators, grant makers and managers to identify, formulate, verify and make sense of outcomes. The method was inspired by the definition of outcome as a change in the behaviour, relationships, actions, activities, policies or practices of an individual, group, community, organisation or institution.

Unlike some evaluation methods, outcome harvesting does not measure progress towards predetermined outcomes or objectives, but rather collects evidence of what has been achieved and works backwards to determine whether and how the project or intervention contributed to the change.

**Table 8.3** Aklan Province outcome harvesting results

| What? | Why? | What was the impact? | Who contributed? Who were the change agents? | | |
|---|---|---|---|---|---|
| Behavioural change—people are dependent on outside support | Project cycle and exit | Negative | | | |
| Community resilience and preparedness | Typhoon Yolanda showed that people were more prepared | Positive | Community volunteer | Barangay officials | Barangay leaders |
| Low sustainability of the activities in the community | Less monitoring from the project implementer | Negative | | | |
| Participation of the community people | Active participation to activities | Positive | MDRRMO | RC143 | |
| Good governance and awareness of the LGU and the community | Active collaboration between the PRC and LGU | Positive | Civil Society Organisations | | |
| Development of DRRM system in Aklan | Active collaboration between the LGU and stakeholders | Positive | Private sector | International NGOs | Volunteers |
| DRR awareness | When typhoon hits, people know what to do | Positive | PDRRMO | MDRRMO | BDRRMO |
| Advocate participatory approach in planning | By disseminating information to communities by drills and simulation | Positive | LGU | International NGOs | |
| Public awareness has risen dramatically | When typhoon frank hit Aklan people started to notice the importance of DRR work | Positive | | | |
| Proactive culture | The school children learned to value "preparedness through training" | Positive | | | |
| Community has become more proactive, prepared and resilient | After several trainings | Positive | MDRRMO | PDRRMO | |

Outcome harvesting method was tested both in Caloocan City and Aklan to measure all possible changes (either positive or negative) observed by the mission informants. Participants of the workshops were given three outcome forms each and were instructed to list the most important changes (from the DP/DRR perspectives) that have taken place in their operating environments. Results of the Aklan outcome harvesting are presented in Table 8.3.

Table 8.3 reports the most relevant changes and outcomes by the respondents. All except two (behavioural change and dependency on outside project support and low sustainability) are positive. Most outcomes relate to behavioural or cultural changes such as: DRR or public awareness has risen, participation has increased, orientation and culture has become more proactive and governance and DRRM system has developed. Respondents were also asked what the main causes for these changes were. External shocks and disasters such as Yolanda and Haiyan in 2013 have been among the most important causes. Also, participation to various drills and trainings has played a major role. Outcome harvesting questionnaire had also one question (scale 1–10) related to the impact of externally funded projects (mainly PRC/FRC project in Aklan) on outcomes listed earlier. Figure 8.10 summarises the main results of the Aklan Study.

The projects seemed to have rather high impact on most of the outcomes (especially on public and DRR awareness), whereas proactive culture and community resilience are more multidimensional phenomena that are not only results of the successful project. Also, two negative outcomes seemed to be caused mainly by other factors beyond the project scope.

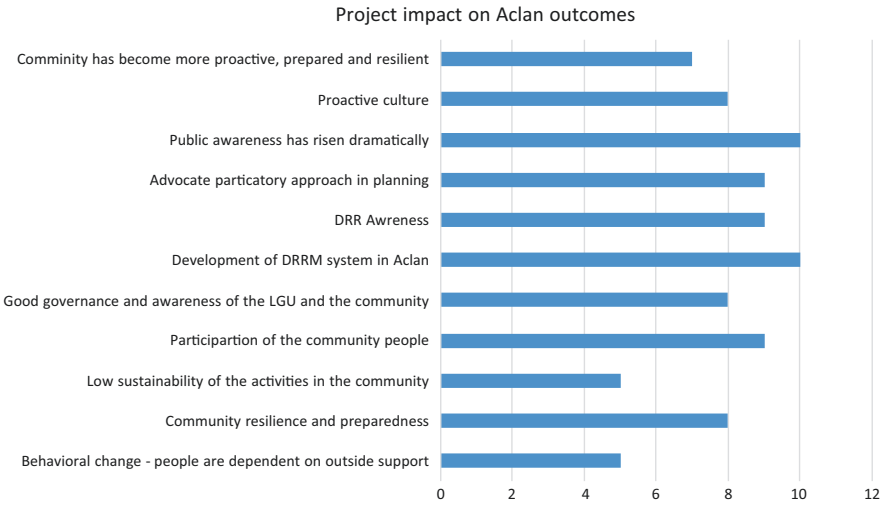


**Fig. 8.10** The impact of the project on Aklan outcomes

## 8.5 Findings and Conclusions

This paper has intended to provide an alternative perspective to study DP/DRR systems. It shows that by applying systems thinking and complexity theory we can understand better the dynamics and interconnectedness of the DP/DRR ecosystems. This applies both to interconnected risks (multirisk landscapes) and interconnected actors (multi-actor networks).

The study has found that systems thinking and complexity theory can provide useful tools for disaster preparedness and reduction. Looking at the DP/DPRR ecosystem as a whole and as a result of interactions and interconnections helps in anticipating risks that otherwise would have gone without noticing and understanding linkages that are useful in increasing resilience in the communities. The study finds that proactive and participatory project design and planning are key factors in successful project implementation and exit as it increases local ownership in projects and thus is likely to improve both the sustainability of a project and the overall resilience. This is also in line with the assumptions of process-oriented resilience which emphasises local knowledge and culture as the basis of resilient DRR strategies. Also, the study states that projects contributing to long-term collaboration practices generate good results. Close collaboration and needs assessment as early as possible was emphasised continuously in the field study interviews and stakeholder workshops.

The study found that vulnerability capacity assessments (VCA) and individual risk maps mostly pointed out the expected major natural risks such as floods, heavy rain, earthquakes and typhoons. However, the analysis of multirisk landscape carried out during the field missions increased participants' understanding on interconnectedness of risks. This helped FRC and local partners to incorporate a broader risk scenario into projects' activities, outputs and outcomes and thus enhanced the future impacts and increased resilience in the communities. In the Philippines, the broadened risk landscape covered also risks related to health issues and urban planning (especially road infrastructure, poor quality of buildings in Caloocan City and waste management in Aklan). Additionally, problems in governance were pointed out as one of the major risks in all of the case studies.

The study found that, identification of major stakeholders is a very important part of successful project planning and implementation because each actor occupies a certain structural position in a network that either constrains or enables actors to pursue their goals and ambitions. In most of the case study projects, the main stakeholders were identified but there were some difficulties in defining the network boundaries. The study found that interlinkages between stakeholders were unknown and there was very little attention paid to cross-sectoral coordination with other critical policy domains (e.g. health, social sector, housing and urban planning). During the field visits, network analysis was introduced as a tool to map inter-organisation stakeholder networks, which illustrates better the complex interlinkages of stakeholders in the ecosystem. Participants in various workshops found this very useful and were willing to get more information and training on network analysis.

The study analysed the stakeholder networks of the case studies and report the main network structures and aggregated the data to see which organisations are acting as power brokers, support agents, guardians and game changers. In all of the case studies, the RC organisations (either headquarters and/or chapters, districts or branches) had a position of a game changer, which was a very positive result. Identifying stakeholder networks and relationships increases the resilience of the ecosystem as it eases collaboration and cooperation among stakeholders in a complex system.

Successful and sustainable DP requires a very good understanding of the overall DM governance in a country. As discussed earlier, community-based DP/DRR cannot provide long-lasting and sustainable results if it is not embedded into a broader institutional DM framework. Likewise, institutional DM does not function if it is not able to mobilise local resources such as volunteer and NGOs.

The results of the study stated that sustainability and long-term resilience are the most critical areas of development in the DP/DRR programmes. Sustainability and resilience can be enhanced by fostering synergy at multiple levels. This includes strong participant and community engagement, strong coordination with several international NGOs and government agencies. The continuation of commitments and resource allocation are also critical measures of sustainability and resilience. Understanding the DP/DRR ecosystem as complex adaptive system and utilising the tools and methods presented in this chapter can help in better anticipating risks to create more resilience and better synergies.

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