

# Chapter 9

## Building Socio-Hydrological Resilience for Inclusion: Experience of Co-operatives in Tanzania



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**Abstract** This chapter portrays that co-operatives be it agricultural or financial are instrument in building socio-hydrological resilience. This is due to the fact that co-operatives are deep rooted to solve societal problems in an inclusive way. The co-operatives are built under social responsibility and caring values which support them in the provision of strong social security to its members. This helps co-operatives to lessen adverse impact on the most disadvantaged groups, and this in turn promotes disaster risk reduction. Likewise, unity as another value of co-operatives enables them to play a philanthropic role after the occurrence of disaster. Co-operatives, being among strong institutions and very close to the communities, are positioned to create awareness for disaster response. Building social hydrological resilience in a more effective and sustainable manner requires comprehensive and all-inclusive approaches which in the one hand are among the pillars inherent in a co-operative ideology. It is also important to note that this does not mean other approaches of dealing with resilience such as engineering resilience and ecological resiliencies are less important. The two approaches are equally important but their success and sustainability will depend on socio-hydrological approach. Thus, it can be concluded that if co-operatives become more adaptive and sustainable mainly as a result of strong management, solid market advantageous, strong venture capital and good governance, they are likely to be resilient not only on financial aspects but also in many other aspects including socio-hydrological matters. This can be demonstrated by their abilities to have self-mobilisation and be able to fulfil the needs of their stakeholders.

**Keywords** Socio-hydrological · Resilience · Co-operatives · Floods · Tanzania

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## 1 Introduction

Globally, it has been seen that in the situation of social insecurity co-operatives have been considered as alternative organisations capable of providing employment and ensure economic stability to people as an individual or group. Various literatures are of opinion that co-operatives can be considered as among the resilient institutions as they have capacities to ensure economic revamp during times of economic instability. However, there is still a gap on how co-operative can become resilient to the socio-hydrological changes. This study, therefore, attempts to explore the degree to which the co-operatives can become resistant institutions during times of socio-hydrological changes (Jaramillo, Stone, Benson, & Eslamian, 2021).

Co-operative is defined as a member-owned organisation which is independent and democratic where people have joined together voluntarily in order to fulfil their common socio-economic goals and expectations (Bwana and Mwakujonga, 2013). They differ from the other private firms due to their close relationship with the community and their ideologies of being an independent and democratic institution. Co-operative being a democratic organisation enables active and full participation of members and transparency in the way of operation and this in turn establishes a less exploitative relation with stakeholders. This leads to the reduction of information asymmetric and enhances a more innovative community.

Experiences show that during economic shocks, co-operatives have been playing a major role to lessen the problem and continue to meet the needs of their members. Co-operative connected in a dense of network of individuals, management and co-operative itself has an impact on co-operative resilience. They are seen as resilient in nature when they are able to satisfy the majority of stakeholders and build clear mechanisms that ensure pellucidity in their operations. In addition, they are regarded as resilient form of organisations probably because they are low risk taker in investment as the focus is on the achievement of long term objectives and not short ones (Allen and Maghimbi, 2009).

Resilience as a concept has been perceived differently by various scholars. Folke (2016) defines the resilience as ability to endure in new changes and continue to grow as per changing environment. Previously, resilience as a concept was very famous in other fields of studies such as biology, engineering and development studies as well as other issues related to natural hazards (Eslamian et al., 2019). Currently, its context has been extended to other disciplines including hydrological, ecological, community, disasters, urban and other hazardous issues (Mao et al., 2017; Reyhani et al., 2017). Despite the fact that the contextual applicability of resilience has been extended, still issues related to socio-hydrological dynamics have not been explained fully particularly in the aspect of floods which face humans (Mao et al., 2017).

The extent to which societies can act and overcome social resilience can be demonstrated by ability of the societies to prepare coping strategies, apply them and address any instantaneous dangers (ability to handle), taking previous lessons and use them to discourse current and future challenges (accommodative abilities), and

societies' capacity to design and develop organisations that promote individual and society welfare development even during the difficulties times (ability to change) (Wurl et al., 2018). In regard to socio-hydrological matters, resilience can also be explained as the way societies can be able to absorb, adapt and transform themselves to ensure their survival and sustainability (Mao et al., 2017).

Eslamian, Reyhani, and Syme (2019) defined socio-hydrological resilience as the ability of a society to cope and overcome any biophysical and hydrological occurrences and continue to survive in the changing environments. In Tanzania hydrological effects are manifested through floods. Floods are climatological occurrences as a result of number of factors including climatic changes such as rainfall variations in terms of strength, interval and volume and watershed characteristics (Kimambo, Chikoore, & Gumbo, 2019). Similarly, Bushesha and Mbura (2015) noted that floods can occur due to overflow of water from water bodies such as lakes, rivers and dams due to breaking of river or lake or dam banks causing water to escape its usual boundaries. River floods normally occur when running water surpasses the ability of the river banks, predominantly at corners which are normally associated with slow water movement. Floods are intense when water bodies intrude and endanger the area of land which is normally used by people. It can be in a farm, town or other inhabited area. Flash floods are ranked the high among natural disasters worldwide and Tanzania in particular. Studies show that globally about half of the area experiences flooding but the intensity differs from region to region and the occurrence is locally unpredictable. For example, in East Africa, floods are considered to be the leading hydro-climatological disaster. It has been observed that the unpredicted climatic changes are the major causes of floods in the region and that instigate many towns and cities to be highly susceptible to floods.

Mafuru and Guirong (2018) observed that in some areas in Tanzania, floods have been caused by prolonged rainfall and in most occasions have overtime caused the substantial damages socially, economically and emotionally. In Tanzania, flood prone areas were found to be in Tanga, Dar es Salaam, Coast, Morogoro, Arusha, Rukwa, Iringa, Kigoma, Mbeya and Lindi regions (Bushesha & Mbura, 2015), which in other aspects of the economy, these regions are the leading in the economic activities particularly agriculture and it is where many co-operatives are found. Of recent years, a number of floods have been plaguing Tanzania. In 2020 a number of floods occurred in some regions where thousands of people were affected. In the northern regions of Tanzania, for example, occurrence of floods accompanied by mudslides destroyed more than 3200 homes; 2700 were households in Kilimanjaro and 50 were households in Arusha. In addition, floods destroyed road network particularly Arusha-Moshi road, causing destruction of normal business routine such as private and business trips and hence people were emotionally, economically and socially disturbed. In coast region about 3500 homes and 6600 hectares of land were destroyed by floods. In Lindi, Mwanza, Morogoro, Manyara and Iringa regions about 1750 houses were made homeless, 15,000 people were affected and 40 fatalities have occurred as a result of floods. This shows the magnitude of the problem for the period of 1 year in Tanzania. The impact of floods is often disastrous and is a

result of both natural and human factors. Table 9.1 shows the socio-economic impact of flood which might occur in any country.

Since floods have been recognized as potential hazards, the Tanzanian Government designed and implemented the policies and programmes as well as establishing institutions to manage the situation and create mechanisms to mitigate the occurrence of disasters caused by floods. Among the efforts made were training candidates on disaster management, establishing a department under the Prime Minister's Office responsible for disaster management, which has committees from the level of region to village, developing Disaster Management Act of 2015 which details the legitimacy of disaster risk management and established Tanzania Disaster Management Agency (TDMA), which is responsible for coordinating disaster risk management in Tanzania.

By understanding the importance of disaster risk reduction, a number of research works have been conducted in Tanzania. Msilanga (2018), for example, assessed community mapping for the flood resilience in Dar es Salaam and concluded that when the communities understand that vulnerabilities in their living environment increase the resilience to floods. Pavlova (2016) assessed the strategies for city resilience to riverine floods in Msimbazi River in Dar es Salaam and noted that the existing mitigation measures could be strengthened in order to avoid the potential risks and harmful consequences of flood hazard and therefore ensure the sustainable progress of towns. Shemdoo (2016) also examined and recommended the potential

**Table 9.1** The negative impact of floods

Group of impacts	Negative impacts
Environmental	<ul style="list-style-type: none"> <li>• Environmental pollution and degradation (soil erosion, land reclamation, etc.)</li> <li>• Animal and floral injuries, diseases and mortality</li> <li>• Water stagnation</li> <li>• Saltwater intrusion</li> </ul>
Economical	<ul style="list-style-type: none"> <li>• High cost of living due to repair and maintenance of properties</li> <li>• Low income earning due to shifting to other areas</li> <li>• Impediment for networking and businesses</li> </ul>
Social	<ul style="list-style-type: none"> <li>• Hindrance for outdoor activities (householding, playing for children, etc.)</li> <li>• Inaccessibility to information and disruption in communication</li> </ul>
Infrastructural	<ul style="list-style-type: none"> <li>• Infrastructure losses (inaccessibility to energy, water, emergency and other facilities and services)</li> <li>• Destruction of infrastructures (if not total destruction but due to moisture wicking materials warping and cupping, surface stains, risk of rust and corrosion, mould)</li> <li>• Overflow of sewage and drainage systems</li> </ul>
Agricultural	Destruction of agricultural fields, crop failure
Health	<ul style="list-style-type: none"> <li>• Injuries and deaths of people</li> <li>• Spread of water-borne diseases</li> <li>• Contamination of drinking water sources</li> <li>• Psychological impacts—Continuing stress</li> </ul>

Source: Authors construction (2020)

measures on minimising risks for people residing in areas prone to floods. Many of these studies focused on the impact of floods and strategies for resilience to floods but none of these findings has assessed the role of community organisations in socio-hydrological resilience. Since the occurrence of disaster affects a mass of people, collective measures are important to reduce risks in disaster prone areas. Co-operative embedded with the value of solidarity, humanitarians' response, social obligation and love for others enables the members to organise and improve their conditions collectively. Thus, in practice it shows that co-operatives have the potential in disaster management compared to other private enterprises. In particular, the aspects of co-operatives as instrument for building socio-hydrological resilience have not been recognised if not rarely mentioned in a few research works. It is for this reason that this chapter will document and share knowledge on building socio-hydrological resilience for inclusion, experience of co-operatives in Tanzania.

This chapter was focused on theoretical and historical perspectives. To ensure a comprehensive study, a number of literature were consulted. The study used a case study design where the experiences of various co-operatives in Tanzania on resilience aspects were explored.

## 2 Theoretical Framework

The concept of resilience is made under three theoretical perspectives: engineering, ecological and social or adaptive resilience. Engineering resilience is the capacity to sustain damage without much loss and is aiming at designing, maintaining and refurbishing infrastructures and the communities in general (Wied, Oehmen, & Welo, 2020). It is usually applied during structural and architectural designing to ensure proper adaptation of technology that minimises hazardous effect during floods and to enable floods tolerance and reduction of recovery time when flood occurs (Zevenbergen, Gersonius, & Radhakrishan, 2020). A comprehensive engineering resilience model was given by Laboy and Fannon (2016) who modified the 4R model (robustness, redundancy, resourcefulness and rapidity) developed by Bruneau et al. (2003) into 6R model. This model details the applicability of engineering resilience into architectural design and its usefulness in flood risk management by taking on board two aspects: risk avoidance and recovery. The 6R model explains how engineering resilience can be employed to prevent occurrence of disaster from early stages of planning, preparedness before occurrence of disaster and the recovering processes (Mayunga, 2007; Zevenbergen et al., 2020). Engineering resilience describes the robustness of the performance of technological systems in order to have a stable function while ecological resilience is used to describe techniques for recognising the dynamics of complex and dynamic natural systems. In regard to this emerging perception, ecological resilience is considered as a process in which the post-traumatic condition may be different from the pre-traumatic condition, but the whole process of recovery is resilient (Linkov et al., 2014; Zevenbergen et al., 2020).

In the setting of flood risk management, ecological resilience is considered as the capacity of a system to withstand/absorb turbulences (such as storm currents and flood clouds) and to remain active under a widespread of flood currents or storm forces. This implies enduring a flood (resistance) or speedy recovery with little impact after being affected by floodwaters (e.g. due to failure of the flood protection system (Gersonius, Van Buuren, Zethof, & Kelder, 2016) aiming at preventing side effects that are very difficult to recover).

The understanding of artificial systems and ecology is exposed to rapidly changing stimuli and shocks and thus that the domain of resilience is changing has called for adherence to the temporal element of resilience. The acceptance of this approach has led to the rise of a system of social and ecological resilience, which identifies nonlinear dynamics, thresholds, how gradual change intervals interact with rapid transition periods and also how to deal with scepticism (e.g. Folke, 2016; Gersonius et al., 2016; Zevenbergen et al., 2020). Social-ecological resilience has been defined as the ability of interlinking social and ecological systems to engross periodic disruptions such as flooding to maintain key structures, processes and responses (Folke, 2016). Furthermore, socio-ecological resilience also demonstrates the extent to which complex systems can adjust themselves and that these systems can build capacity to learn and adapt (Zevenbergen et al., 2020). This is the comprehensive concept of resilience which has been assumed in the sphere of climatic change variation in order to tackle two things: steady, disturbing changes and shockwaves as a result of climatic change and unpredictability (Linkov et al., 2014). In this context, a flexible, resilient strategy does not depend on static conditions, but explicitly focuses on unpredictable changes—such as climate change. In the context of climatic change, adaptation often refers to feedbacks that intend to create awareness on the impact of climatic change. The word adaptive means the revision of a plan or strategy that follows new knowledge (Zevenbergen et al., 2020).

Socio-ecological approach best explains Socio-Hydrological Resilience for inclusion, this is so because as Eslamian et al. (2019) put it that it is the ability of society to adapt to biological and hydrological changes and continue to thrive as per continuing-changing environment. The social hydrological resilience is based on the assumptions that management of water problems should not be primarily taken as technical issues rather policy issues with the involvement of various stakeholders and institutions (Paul et al., 2017). Growth which is sustainable normally goes together with cultural and material needs satisfaction that is necessary for all people living with self-respect that everyone deserves. Zevenbergen et al. (2020) have established the role of human beings in the sphere of water by developing a socio-hydrology as a way to recognise broader techniques in the management of hydrological resources aimed at building resilience.

### 3 Empirical Literature

This area presents the results of previous studies as per the subject matter. These studies provide a broader view of the knowledge of the resilience in aspect to socio-hydrological systems as well as identifying a gap. Wurl, Gámez, Ivanova, Imaz Lamadrid, & Hernández-Morales, (2018) presented the prominent knowledge in analysing the hydrological resilience of an arid aquatic ecological system beneath forthcoming extraction conditions and alteration of climate change. The scrutiny shows the suitable basis for recognising the relationship between social and hydrological systems. To envisage the water course under diverse human situation or context, different gauges are modelled to establish the real impact of human–water systems. This particular information assists in understanding the matter concerning participation of different people in decision-making in turn around the negative effects of present water management and climatic change. This piece of writing assists to comprehend the issues in relation to participation of various indigenous patrons and policymakers in turn round the negative effects of contemporary water management and climate change. Xu, Gober, Wheeler, and Kajikawa (2018) examined the trends in socio-hydrological resilience by means of mixed methods. The study found that the domain is still inhabited by hydrologists, with little, and of course insufficient contribution, from social scientists. Three topics were suggested to constitute themes focusing in hydrological matters. The first is systemic risk and natural hazards, the second is sustainable science and third is about the adaptive governance. Thus, the use of multifunctional approaches is apparent when dealing with natural hazards.

Zevenbergen et al. (2020) offered a comprehensive description of the thoughtful and appreciation of challenges of flood disaster management and significant adaptable measures in arid urban areas through a social and hydrological system. The study found that weak institutional capacity, poor governance, inadequate resources and bad urban planning are the main issues challenging disaster management. Improving awareness and engagement of civil society in dealing with the hazard was among the approach recommended to reduce risks. Veetil, Konapala, Mishra, and Li (2018), on the other hand, presented a modelling system using a machine learning technique to forecast the hydrological ratio for water bodies situated in the USA using a set of climate, soil, vegetation and geographical changes. The study used nonlinear elasticity to determine the potential influence of hydrological balance estimates on various drought characteristics (resilience, vulnerability and proximity) to the river. It was found that a machine learning technique based on random forest algorithm could economically estimate the atmospheric ratio of hydrogen balance sufficiently observed and the data needed to be manageable.

Sharma and Goyal (2018) provided useful knowledge in assessing the resilience of land ecological system in India for water climatic turbulences in the district (i.e. the administrative unit). This article found significant atmospheric differences in Ecological Water Use (WUE) at the region level, which was complex in the Himalayan regions compared to other countries. Resistance was measured by the

WUE ratio under drought conditions and the WUE average, which shows the capacity to take in the disturbances of the hydro-climate disturbance. The findings from this study outlined the need for appropriate policies of ecosystem management in India and provided an analysis of how this process could continue.

Conversely, Hough, Pavao-Zuckerman, and Scott (2018) proposed a social-ecohydrological thresholds (SEHT) framework that integrated the social hydrological, trait-based ecological and ecosystem services concepts. San Pedro riparian corridor in Arizona was a case under investigation, the SEHT framework was utilised as analytical framework to identify key drivers and thresholds in the social-ecohydrological system. Their results showed that the use of the SEHT system facilitates the identification of several key catalysts of possible thresholds in ecosystem services derived from the natural or social components of the entire system.

Based on the above empirical studies, it is clear that the studies on hydrological resilience have been conducted worldwide. Yet, little research has examined how co-operative societies can build a social hydrological resilience, particularly the extent to which co-operatives promote “Socio-Hydrological Resilience” for inclusion in Tanzania context. Therefore, it is against this fact that this study aimed to fill the existing gap by documenting and share experience on “Building Socio-Hydrological Resilience” for inclusion experience of co-operatives in Tanzania.

## **4 Co-operatives as Instrument for Socio-inclusion: A Conceptual Framework**

The co-operatives are businesses owned by members. The easiest way to recognise co-operatives is that they encompass the market power of people whom by themselves could have achieved little or no success and in so doing provided the means to escape poverty and incapacity (Birchall and Ketilson 2009). The well-known definition of co-operatives as per the United Nations Guidelines and ILO R.193 (2002) and the International Co-operative Union (ICA) is that co-operatives are an independent association of people willingly joined together to satisfy their common economic, social and cultural needs and aspirations, through a mutually owned and constitutionally organised firm.

Co-operatives are governed by seven key principles: voluntary and open membership; control; democracy; economic participation of members; freedom and liberty; education, training and information; cooperation between co-operatives and caring for the community (Rwekaza & Muhihi, 2016). Voluntary and open membership, control, democracy and economic participation of members are the basic principles which give co-operative its identity. They give power for members to control, own and benefit from the firm. Other principles such as education is an obligation for membership to ensure members seriousness and is therefore a prerequisite for democratic control, while cooperation between co-operatives is in fact a business strategy to ensure economic sustainability of co-operative. The final principle,



caring for others, differentiates co-operative from other businesses as co-operative is there to ensure the particular community grows in terms of social and economic. In many cases, one of the goals of a co-operative is to satisfy the needs of the broader community and for that case, co-operatives are regarded as social and economic business organisations. Conversely, in co-operatives a sense of inclusion is given priority as all people get chance to members without considering their differences in terms of income, ethnicity and the like (Vieta & Lionais, 2015). Being an inclusive society means management of all aspects that can create discriminations among members such as racial, gender, class, genealogy and location and ensures that all members get equal chance to participate, have opportunity and ability to determine an acceptable set of social institutions which regulates their social collaboration. These elements make co-operatives to be different from other business ventures and become very effective tool in handling unforeseen events such as disasters and therefore become very important in guaranteeing sustainable social and economic development. This is because co-operatives adhere to the good governance pillars of transparency, democracy, rule of law, respect for human rights and accountability. In addition, co-operatives are built under social policies of ensuring equal opportunities to all members and thus form a society that is flexible and resilient. In order to create and develop an inclusive society, it is important that all members of the community be able and encouraged to participate in all matters relating to social, culture, economic and politics, at national and international levels. Rwekaza and Muhihi (2016) noted that a society which best adheres to the principles of inclusiveness is the one that ensures its members have equal chances to participate in decision-making, getting their basic needs and all members feel recognised in their doings.

## **5 The Role of Co-operatives in Building Socio-Hydrological Resilience for Inclusion: Experience of Tanzania**

It is believed that socio-hydrological resilience built under equality and empowerment will last longer since development ought to be for all members who are directly or indirectly affected by it. Thus, the problem of hydrological events including flood worldwide and Tanzania inclusive can be solved through co-operative processes from agriculture to finance. By understanding this great role of co-operatives, UN General assembly through Resolution No. 62/128 calls upon the Government and other agencies of UN as well as other stakeholders to seat together and appreciate the role of co-operatives in representing a large group of people in a community compared to other civil (Rwekaza & Muhihi, 2016). This is in line with Tanzania Co-operative Development Policy of 2002 which also gives emphasis on the role of co-operatives in bringing equality in socio-economic development.

The International Co-operative Alliance (ICA) and its members have shown a good example in delivering resources and extending unity and in the same manner

co-operatives are very essential in disaster risk reduction and management if encouraged and supported by the government and other organisations as partners in joint efforts. Co-operatives can mobilise resources to assist during occurrence of disaster and restoration as a way of reviving the local economy. Since co-operatives are important in the socio-economic development of a country, they can be considered as backup in the global problems of food insecurity and economic instability. In this regard, the participatory financial system signifies the footsteps of equality in hydrological resilience. Hydrological resilience for inclusion will be sustainable and have far reaching impact if there is empowerment and fairness. Therefore, worldwide, the co-operative processes from agricultural to financial can assist to address the problem associated with hydrological phenomena of unfairness and poverty.

An agricultural marketing association is a group of farmers who willingly work together to integrate their produce for sale. That joint production is sold and circulated through co-operatives that are owned and organised by the farmers themselves. All over the world, farmers are more and more motivated to join market co-operatives. Statistically, the market share of agricultural produce circulation from production site to end-users is largely held by the co-operatives (Tchami, 2007; Zevenbergen et al., 2020). Conversely, the financial co-operatives popularly known as Savings and Credit Co-operative Societies (SACCOS) are associations which like other forms of co-operatives members are willing to join together and put together their funds and consequently can get loans that they can use for different purposes (Bwana & Mwakujonga, 2013). The primary aim of these societies involves the mobilisation of resources from which individual co-operators may benefit. That is, to promote savings and make credits available to the members (Mwakajumlo, 2011; Kumburu, Pande, & Buberwa, 2014).

## 6 Experience of Co-operatives in Tanzania

In Tanzania, there are some evidences that show the growth of co-operatives in terms of number and finance. Apart from other actors in socio-economic development in Tanzania, co-operatives are also very important. Presently, in Tanzania there are different forms of co-operatives including financial, agricultural marketing, fisheries, livestock, mining, irrigation, housing and industrial co-operatives (Table 9.2).

Statistics indicate that in 2018, there were 41,835,042 registered co-operatives in Tanzania, with a membership of 2,489,376; share capital of Tsh 325, 590, 252, 019.46. (Kumburu et al., 2014). The financial co-operatives, mostly SACCOS are the main co-operatives in Tanzania and account for 56% of all members followed by Agricultural Marketing Co-operatives (AMCOS) (36%) and the rest accounts for 8%. Financial co-operatives in Tanzania include SACCOS and co-operative banks. It is estimated that out of five households in Tanzania, there are almost eight million people who benefit from co-operative services taking the current estimated population of 50 million people. Furthermore, not only members who benefit but also other non-members and it is estimated that around 2.5 million people benefit from

**Table 9.2** The status of co-operatives in Tanzania by December, 2018

Sn	Coop type	Male	Female	Groups	Institutions	Total	Shares (Tshs)
1	SACCOS	785,017	316,560	14,735	1879	1,118,191	163,617,260,840.85
2	AMCOS	780,452	314,719	14,649	1868	1,111,688	156,438,168,399.76
3	Consumer	8478	3419	159	20	12,076	767,202,378.85
4	Irrigation	17,174	6926	322	41	24,463	772,714,252.00
5	Livestock	32,827	13,237	616	79	46,759	648,887,421.00
6	Industrial	8044	3244	151	19	11,458	496,254,533.00
7	Housing	3478	1403	65	8	4954	906,450,874.00
8	Mining	22,392	9030	420	54	31,896	224,340,300.00
9	Fisheries	13,696	5523	257	33	19,509	103,525,000.00
10	Others	76,089	30,683	1428	182	108,382	1,615,448,020.00
	<b>Total</b>	<b>1,747,648</b>	<b>704,742</b>	<b>32,803</b>	<b>4183</b>	<b>2,489,376</b>	<b>325,590,252,019.46</b>

Source: Tanzania Co-operative Development Commission (TCDC) (2020)

co-operative services. This implies that over ten million people (account for almost 20% of the total population) benefit from co-operative services. The data quantify that the co-operatives sector was making huge business and members benefited out of it. This show how useful the co-operatives are. It is apparent that if co-operatives are engaged in socio-hydrological issues can play a big role in managing hydrological problems.

## 6.1 Co-operative and Environmental Resilience

Hydrological disaster has a negative impact to environment such as environmental pollution and degradation (soil erosion, land reclamation, etc.), animal and floral injuries, diseases and mortality, water stagnation and saltwater intrusion. This impact requires the joint efforts and collective responsibility. The sense of joint efforts and collective responsibility is also shown in co-operatives through one of the core values, solidarity. This value enables co-operatives to play a philanthropic role during post-disaster. For example, Moshi rural SACCOS located in Kilimanjaro, Kitunda SACCOS located in Dar es salaam and Ilulu SACCOS located in Lindi regions in Tanzania showed a sense of solidarity when members or people came together to help one another in clearing farms and street after 2020 floods in the areas (Figs. 9.1 and 9.2).

Co-operatives absorb the costs of flood damage and try to protect the members so that in later days they are not affected. For example, in unplanned residence number of actions has been taken to avert flood damage. Common methods include the use of sandbags, tree logs. Furthermore, on the aspect of sanitation co-operatives do provide soft loans to members so that they can rehabilitate toilet facilities by raising pit latrines and doorsteps as well as the provision of water outlet pipe. On the aspect



**Fig. 9.1** Co-operatives members cleaning streets

of water in the house co-operatives offer seasonal displacement to members affected for free as well as education on water boiling and treatment.

## ***6.2 Co-operative and Economic Resilience***

Economic shocks emanating from hydrological disasters cannot be ignored, this is because of the impact brought by such disasters including increased living expenses, reduction of earnings, loss of valuable assets and impediment for communication and businesses. Using the values of social responsibility and caring for others enable co-operatives to provide a solid social protection that mitigates the crises impact on the most vulnerable groups. For example, Mruwia agriculture marketing co-operatives had to encourage members to donate some amount of money so as to help those in need. It was also found that the less affected members had to accommodate most affected members until their houses were rebuilt and rehabilitated. SACCOS being near to communities and being member-based kind of organisation have mechanism that is used to cope with shocks due to its availability and timeliness. Co-operative decreases vulnerability of the members by distributing risk among individuals. Financial co-operatives, such as SACCOS can offer loans to members so as to enable them to help cover meet costs of shocks in household



**Fig. 9.2** Sandbags to prevent floods

budgets, re-establish their closed business as well as re-purchase of destroyed household assets. This is because the financial resource and education can be accessed quickly compared to other forms of organisations. In addition, some SACCOS have established disaster basket fund which together with the ideology of cooperation becomes important in disaster risk reduction in the community. Thus, it can be said that co-operative being reliable, effective may prevent a family from being worse off and in turn they become instrumental in building hydrological resilience than other form of organisation (Figs. 9.3 and 9.4).

Financial co-operatives in Tanzania (SACCOS) methods of ownership and capitalisation are critical component forming the difference in the pecuniary points of credit unions and banks and present advantages them. However, they are not subjected to risks compared to other forms of financial organisations. Since SACCOS are member-driven and self-help to a large extent do not impose risk to borrowers or members. Their governance structure ensures the patronage, accountability and transparency in a way that members who obtained loan to cope with disaster or floods know in one way or another that money is another member's money.

SACCOS are independent from capital markets for funding, because they are guided by savings first and credit later, and that major source of funding is from member deposits and savings. Member's satisfaction is their main motive rather than profit, this makes them escape from unnecessary risks. In view of that, SACCOS are most ideal in building hydrological resilience because of the principles underlying SACCOS operations.



**Fig. 9.3** Reconstruction of houses after floods

### ***6.3 Co-operative and Social Resilience***

Hydrological disasters have affected the social matters negatively as such there was hindrance for the outdoor activities (house holding, playing for children and missed days of schooling,) as well as inaccessibility to information and disruption in communication. One of the core principles of co-operatives is concern for the community. Co-operatives to a large extent played this role through provision of counselling services to affected members so as to cope with isolation emanating from lack of outdoor activities. At the same time, less affected members had to accommodate most affected members until their houses were rebuilt and rehabilitated. Various assistance and aids in forms of money and school uniforms are donated to affected family so as to enable the affected children resume to their study as well as information concerning availability of outdoor activities, access to credit, market access as well as information on the various resilience techniques. The combined effect of these positive results of co-operatives has greatly affected the hydrological resilience of the members (Figs. 9.5 and 9.6).



**Fig. 9.4** Loss of household assets



**Fig. 9.5** Students in uniforms and balls donated by co-operatives



**Fig. 9.6** Commination break down between Kilimanjaro and Tanga region

#### **6.4 *Co-operative and Infrastructure Resilience***

Hydrological disaster has a negative impact to infrastructure such as the infrastructure losses (inaccessibility to energy, water, emergency and other facilities and services) or destruction of infrastructures (if not total destruction but due to moisture wicking materials warping and cupping, surface stains, risk of rust and corrosion, mould) and overflow of sewage and drainage systems. Co-operatives had to intervene in 2019 floods by offering emergence loans to members so that they can restore the damaged infrastructures such as water and electricity which was severe damaged but again through its corporate social responsibility co-operative donated about 50,000,000 Tsh equivalent to 21,000 \$ so that road infrastructures in rural areas can be rehabilitated (Figs. 9.7 and 9.8).

#### **6.5 *Co-operative and Agricultural Resilience***

Hydrological disaster affects the agriculture activities and production negatively as such it leads to destruction of agricultural fields, crop failure. Co-operative structure reduces individual risk by sharing risks between groups of individuals. Co-operatives are also pro-poor organisations. Financial co-operatives, SACCOS inclusive are very important in serving members interests during the time of shocks or emergence in terms of loans, advance salary or emergence fund. In addition, they can assist members to meet their business requirements throughout the business cycle. They can be farmers, fisheries, livestock keepers or miners. For example, Mruwia agriculture marketing co-operatives had to encourage members to donate some amount of money so as to help those in need. It was also found that the less affected members





**Fig. 9.7** Electricity infrastructures covered by water



**Fig. 9.8** Road infrastructures affected by floods

had to accommodate most affected members until their houses were rebuilt and rehabilitated. SACCOS being near to communities and being member-based kind of organisation have mechanism that is used to cope with shocks due to its availability



**Fig. 9.9** Co-operative food donation during floods

and timeliness. This is because the financial resource and education can be accessed quickly compared to other forms of organisations. In addition, some SACCOS have established the disaster basket fund which together with the ideology of cooperation becomes important in disaster risk reduction in the community. Thus, it can be said that co-operative being reliable, effective may prevent a family from being worse off and in turn they become instrumental in building the hydrological resilience than other form of organisations.

In overall, because of their values, extensiveness and diverse presence in various sectors, co-operatives are well positioned to strengthen human security in all its aspects. Agricultural co-operatives focus on food security problems, while financial co-operatives promote financial inclusion and are resilient financially, economically and in natural disaster. 2020 flood in Tanzania left more than 8500 houses and 9600 hectares of farms destroyed, these people and household left with no food. But agriculture marketing co-operatives and SACCOS such as Hai Rural Teachers SACCOS, Same Kaya SACCOS, ELCT, ND SACCOS, Mruwia AMCOS and Mamsera donate food, organise training among members on how to store the foods during floods and other calamities (Figs. 9.9, 9.10, and 9.11).

SACCOS are independent from capital markets for funding, because they are guided by savings first and credit later and that major source of funding is from member deposits and savings. Member's satisfaction is their main motive rather than profit, this makes them escape from unnecessary risks. In view of that, SACCOS are most ideal in building hydrological resilience because they do not seize crediting operation, loan interest rate does not change at a high cost and is usually more stable due to the different capitalisation and lending practices.



**Fig. 9.10** Reconstruction of houses after floods



**Fig. 9.11** Food items donation after floods

## 7 Conclusion

The Role of Co-operatives in Building “Socio-Hydrological Resilience” for inclusion Experience of Tanzania has been presented in this chapter. Literature revealed that the floods are among the highly ranked natural disasters worldwide. It has also observed that there are three theoretical frameworks of resilience which are engineering resilience, ecological resilience and socio-ecological or adaptive resilience. These frameworks can be employed to explain how co-operatives can be regarded as adaptive resilient. The proposition of this study is that the co-operatives are found to be best explained in the context of socio-ecological or social hydrological resilience. This is so due to their role of ensuring community inclusiveness and joining together people of diverse socio-economic traits. Thus, this makes the co-operatives unique and very effective instrument in managing risk and disaster also ensuring the sustainable socio-economic development. Although there are little or no researches

which vividly explain how co-operatives can build socio-hydrological resilience, it can be established that if the co-operatives are built in more adaptive and sustainable manner, they may become more socio-hydrological resilient. The chapter, therefore, has shown that the co-operatives either agricultural or financial are instrument in direct selling.

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