

Building community resilience to disasters in WaSH (Water, sanitation and hygiene) during recovery

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'I, Sneha Krishnan confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.'

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Abstract

Recurring and multiple disasters affect water and sanitation facilities and disrupt services. The frequent displacement and disaster losses influence hygiene behaviour and recovery priorities. Post disaster water, sanitation and hygiene (WaSH) recovery support by government and NGOs and its linkages with development are under-researched areas. This research explores approaches for building community resilience in WaSH during recovery using two case studies from Eastern India, Assam and Odisha. Participatory Learning and Action (PLA) tools, semi-structured interviews, participant observations, photographs and documents are used to gather qualitative data. The analysis provides an understanding of WaSH during recovery at different scales including households, communities, governments and humanitarian agencies.

In Assam and Odisha, there were changes in hygiene practices, access and availability of WaSH facilities, achieved through experiential learning and agency support. Learning within humanitarian NGOs occurred during implementation, mainly from the communities and technical experts. Government agencies in Assam focused on flood protection measures, which forced the flood-affected populations to relocate without any resettlement support. In Odisha, the government undertook effective evacuation and relief measures and planned for reconstruction, but largely ignored sanitation. During recovery water supply was prioritised over sanitation and hygiene, overlooking gender aspects and menstrual hygiene. Thus, an opportunity during recovery to influence WaSH practices and to address open defecation challenge is missed. The humanitarian action is fragmented across sectors that emphasise, prioritise productive assets such as livelihoods, and shelter over WaSH systems.

This research argues for longer-term and intersectoral recovery programmes that reflect community priorities through increased participation. This will help in transforming pre-existing WaSH practices and attitudes towards sanitation. This thesis concludes that integrated approaches should consider the pre-disaster practices, recovery and development plans for effective programming. The recovery programmes should factor learning and effective participation for building community resilience and bringing about transformational changes.

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Abbreviations

ACF – Action Contre la Faim

ADB – Asian Development Bank

ALNAP – Active Learning Network for Accountability and Performance in Humanitarian Action

ANM – Auxiliary Nurse Midwives

APHED – Assam Public Health Engineering Department

ARWSP – Accelerated Rural Water Supply Programme

ASDMA – Assam State Disaster Management Authority

ASHA – Accredited Social Health Activist

AWW – Anganwadi workers

BBB – Build Back Better

BBSR – Bhubhaneshwar

BCC – Behaviour Change Communication

BDO – Block Development Officers

BWTU – Bulk Water Treatment Units

CATS – Community approaches to total sanitation

CBO – Community based organisations

CDPO – Child Development Project Officers

CFW – Cash for work

CGI – Corrugated Galvanised Iron

CHAST - Children's Hygiene And Sanitation Training

CLTS – Community Led Total Sanitation

CSO – Civil Society Organisations

DDMA – District Disaster Preparedness Authority

DDMP – District Disaster Management Plans

DIPECHO – Disaster Preparedness ECHO (European Community Humanitarian Aid Office)

DRDA – District Rural Development Authority

DROP – Disaster Resilience of Place

DRR – Disaster Risk Reduction

DWL – daily wages labour

DWSM – District Water and Sanitation Missions

ECHO – European Commission's Humanitarian Aid and Civil Protection Department (formerly, European Community Humanitarian Aid Office)

EWB – Engineers without Borders

EFSL – Emergency Food Security and Livelihoods

FFW – Food For Work

FGDs – Focus Group Discussions

FREMAA – Flood and River Erosion Management Agency of Assam

GB – Great Britain

GO – Government organisations

GoA – Government of Assam

Gol – Government of India

GoO – Government of Odisha

GP – Gram Panchayat (Gaon Panchayat in Assam)

GRO – Grassroots organisations

OSB – Orissa State Branch

OSDMA – Odisha State Disaster Management Authority

HP – Hygiene Promotion

IAG – Inter Agency Group

IDS – Institute of Development Studies

IEC – Information, Education and Communication

IFRC – International Federation of the Red Cross and Red Crescent Societies

IHHL – Individual household Latrines

IIED – International Institute for Environment and Development

IMD – India Meteorological Department

INEE – Inter-Agency Network for Education in Emergencies

INGO – International Non-governmental organisations

INR – Indian National Rupees

IRC – International Rescue Committee

IRCS – Indian Red Cross Society

KAP – Knowledge, attitudes and practices

Kg – kilograms

Kmph – Kilo meters per hour

LA – Local Agencies
LRRD – Linking relief, recovery and development
M II/M III – Mark 2 or Mark 3 handpumps
MDG – Millennium Development Goals
MDWS – Ministry of Drinking Water and sanitation
MEAL – Monitoring, evaluation and Learning
MGNREGS – Mahatma Gandhi Rural Employment Guarantee Scheme
MNP – Minimum Need Programme
MoU – Memorandum of Understanding
MSF – Médecins sans Frontières
NBA – Nirmal Bharat Abhiyan
NDMA – National Disaster Management Authority
NFIs – Non-Food Items
NIDM – National Institute of Disaster Management
NGO – Non-governmental organisations
NGP – Nirmal Gram Puraskar
NOC – No-Objection Certificates
Novib – Agency A’s affiliate partner from Norway
NRDWP – National Rural Drinking Water Programme
OCHA – United Nations Office for the Coordination of Humanitarian Affairs
ODF – Open Defecation Free
ODI – Overseas Development Institute
OFDA – Office of U.S. Foreign Disaster Assistance
ORC – Odisha Relief Code
ORS – Oral Rehydration Salt
OSWSM – Odisha State Water and Sanitation Mission
PDM – Post Distribution monitoring
PDPN – Pre-disaster Preparedness Network
PHAST – Participatory Hygiene and Sanitation Transformation
PHE – Public Health Engineering
PHED – Public Health Engineering Department
PHP – Public Health Promotion

PLA – Participatory Learning and Action
PMandE – Participatory Monitoring and evaluation
PoUWT – Point-of-use water treatment
PUR – water packets by Proctor and Gamble
PVC – Poly vinyl chloride
PWSS – Piped Water Supply Scheme
PWD – Public Works Department
RCC – Reinforced Concrete Cement
RedR – Registered Engineers for Disaster Relief
R&DM – Revenue and Disaster Management
RDD – Rural Development Department
RO – Reverse Osmosis
RRF – Rapid Response Facility
RTE – Real-Time Evaluations
RWH – Rain Water Harvesting
RWSN – Rural Water Supply Network
RWSSS – Rural Water Supply and Sanitation Schemes
SanCoP – Sanitation Community of Practice
SBA/SBM – Swachh Bharat Abhiyan/Mission (Also referred as CIM – Clean India Mission)
SC – Scheduled Caste
SEM – Self-Employed Mechanics
SFDRR – Sendai Framework for Disaster Risk Reduction
SHGs – Self Help Groups
ST – Scheduled Tribes
SuSanA – Sustainable Sanitation Alliance
TF – Task Force
TOT – Training of trainers
TSC – Total Sanitation Campaign
VDCs – Village Development Committees
WaSH – Water, Sanitation and Hygiene
WEDC – Water, Engineering and Development Centre
WHO – World Health Organisation

WRD – Water Resources Department

WSSO – Water supply and support organisation

UCT – Unconditional Cash Transfers

UK AID – UK Department for International Development (formerly known as DFID)

UNCRPD – United Nations Convention on the Rights of Persons with Disabilities

UNHCR – UN High Commissioner for Refugees

UNICEF – United Nations Children’s Fund

UNCESCR – UN Committee on Economic, Social and Cultural Rights

UNCRPD – United Nations Convention on the Rights of Persons with Disabilities

VDC – Village Development Committees

Glossary

Ahom: Local indigenous people from Assam

Anganwadi: courtyard shelter used as schools for 0-6 years old children

Baanpani: floods

Bodo: Assamese indigenous tribes

Borakhun: heavy rains

Chappals: footwear

Chaporis: Assamese term for *chars* – unstable and temporary land formations in the river

Chars: fertile patch of land generated in the river in Bangladesh, a term commonly used in Assam

Chotai: mats made of jute

Chullas: traditional rural cooking stove

Crèches: space for babies and young children for care during the working hours

Crores: ten million (10,000,000)

deutero learning: the skill in handling and influencing capacities for self-organisation by ‘learning to understand’

hectares: a metric unit of square measure, equal to 100 acres

job card: a record card under the MGNREGS giving details of the time taken to do a piece of work

Jhali: netted filter

jhadoo: broom

Kaccha: temporary

Kacharigaon: camp settlement

Kolshi: traditional water pots made of aluminium

Lakh: a hundred thousand

Log frame: tool for improving the planning, implementation, management, monitoring and evaluation of projects

Mishing: a local tribe living in upper reaches of Brahmaputra, also called as flood people of Assam

Mistry: Technician, artist

NaDCC – Sodium Dichloroisocyanurate (Troclorose Sodium), a form of chlorine for disinfection.

Nagmagic: Brand of toilet squat slabs

Panchayat: a village council

Paakghar: traditional Assamese kitchen

pH: a measure of how acidic/basic water is

Purdah: gender-based segregation and seclusion norms where women cover their faces with veils

Pukka: concrete, permanent

Rabi: winter crops

Saree: Indian women's attire that women drape around the body

Sahis: hamlet, smaller unit of a village in Odisha

Sarpanch: Village headman

Setu: bridge

Sitreps: situation reports

1 GBP = 100 INR

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Chapter 1: Introduction

1.1 Research Topic and context

Through investigation of water, sanitation and hygiene (WaSH) systems during disaster recovery, this thesis examines approaches for promoting community resilience. Two case studies from Eastern India, in Assam and Odisha, are explored to understand post-disaster recovery processes, technologies, and approaches used in WaSH programming to promote community resilience. The impact of a disaster is determined by the level of resilience and preparedness within a society, its infrastructure and its government (Bosher and Dainty 2011). Resilience is a ubiquitous term in disaster risk management, an increasingly prominent concept in discussions about the post-2015 policy landscape but riddled with competing meanings and diverse policy implications (Matyas and Pelling 2015). Disaster recovery is seen as a crucial aspect of disaster risk management, with boundaries that cannot be clearly defined (Raju 2013). Recovery is more than simply re-establishing the physical or built environment; it is a social process that begins before a disaster and encompasses decisions about emergency response, restoration, and reconstruction activities (Nigg 1995). The 'development' approaches in a post-disaster environment can bring either progress or destitution, by choice or inevitability, due to the complexity of 'disasters' (Collins 2013).

The concept of resilience in science has been closely related to systems theory (Alexander 2013). The systems approach allows a comprehensive and cross-disciplinary view of the many apparently separate facets of a complex reconstruction process (Johnson et al. 2006). Systems thinking is useful to study complex 'living' systems undergoing numerous dynamic exchanges at any given time (da Silva et al. 2012). Resilience is achieved at multiple levels of analysis and intervention (individual, community, city, regional and national), multiple time scales (prevention, emergency, rehabilitation, reconstruction and long-term development), and multiple sectors of intervention (emergency action, physical reconstruction and housing) (Lizarralde et al. 2014). Systems thinking guides the development of frameworks, methodologies and applications that facilitate learning about all these aspects (Checkland 1985). This research adopts systems thinking to study different system components and parts, their interaction, networks and flows (Korhonen 2007). This research adopts an interdisciplinary approach that is able to manage the complexity of a disaster context (Mileti, 1999). The thesis explores multiple perspectives, at various timescales, levels and sectors.

In this thesis, WaSH systems collectively refer to emergency programming, provision of water and sanitation facilities, service delivery, and hygiene practices. There are emergency and developmental WaSH approaches. Diseases occurring after disasters are linked to an inadequate water supply or poor sanitation and hygiene practices (John Hopkins and IFRC n.d.). Environmental sanitation programmes are vital for tackling diseases, and ensuring human dignity in emergency situations (Harvey and Reed 2005). The most common causes of death in young refugee children are diarrhoea, pneumonia and malnutrition (Davis and Lambert 2002). The challenge in WaSH programming is the transition from emergency response to recovery, which affects the nature and scope of implementation (King 2015). The conventional emergency WaSH approaches are supply-driven to fulfil life-saving needs, whereas recovery, it is argued should focus on demand-led approaches (Luff 2013). These demand-led approaches, integrated with livelihoods-based WaSH interventions help to reduce the dependency of communities on agencies during transition from relief to development (Scott 2013a). This research reviews existing grey literature – agency reports, briefing notes, conference proceedings, inter-agency consultation reports, and training programmes – to understand the state of art in WaSH during recovery.¹ The literature on recovery mainly focuses on housing and sheltering options, while WaSH during recovery remains a critical gap in knowledge and practice.

The impact of disasters on progress of WaSH in the development context and post-disaster changes are under-researched. According to the 2011 census, 67% of rural households in India defecate in the open, despite decades of government spending on latrine construction (Coffey et al. 2014). This thesis explores the policies in India pertaining to disaster recovery and WaSH: the Disaster Management Act (2005), water and sanitation schemes [Total Sanitation Campaign (TSC), later renamed as Nirmal Bharat Abhiyan (NBA) and recently as Swachh Bharat Abhiyan (SBA)]. Prime Minister Narendra Modi's Swachh Bharat Abhiyan (Clean India Campaign), was launched on 2 October 2014, with the aim to make India clean by 2019 (Kumar 2014). This research uses two case studies from Assam and Odisha, which were affected by disasters in the recent years and had high open defecation rates.

¹ Refer Annexure 1: State of art of WaSH programming and evidence

1.1.1 Assam case study

Assam, in North-Eastern India is a high rainfall region with an average annual rainfall of 2,546 mm. It receives about 60 to 70 per cent of the monsoon rain from May to August (Hazarika, 2006). This results in multiple flood waves within a given year. Assam faced recurring floods in 2000, 2004, 2008, and 2012 (AASC n.d.; Goswami 2000; Hazarika 2006). Studies show that floods affect WaSH systems: water sources are damaged, quality of drinking water deteriorates, and people use floodwaters and practise open defecation, which poses challenges for women and adolescent girls (Prasad and Mukherjee 2014). This research focuses on 2012 and 2013 floods in Solmari village – on the northern banks of Brahmaputra – under Sonitpur district and Boramari Kacharigaon village – on the southern bank lower reaches of Assam – under Morigaon district. Sonitpur has a total population of 1.92 million (0.99 million males and 0.93 million female); population density is 370 people per sq. km. and sex ratio is 946 females per 1000 males and (Census, 2011). Morigaon has a total population of 957,423 (486,651 males and 470,772 females); population density is 617 people per sq. km and sex ratio is 967 females per 1000 males (Census, 2011).

1.1.2 Odisha case study

Odisha faces multiple disasters such as floods, cyclones and droughts, and faces poverty, unemployment, and low per capita income (Ray-Bennett 2009a). Odisha has the lowest level of household toilet access in India: at an 84.7 per cent open defecation rate (MHA, 2011 cited in Mommen and More, 2013). Between 1993 and 2011, toilet coverage in Odisha increased from 1.4 per cent to 14 per cent – an annual increase of around 0.7 per cent (Mommen and More, 2013). This research focuses on Puri and Balasore districts after the cyclone Phailin and subsequent floods in 2013. In 2011, Puri had a population of 1,698,730 (865,380 males and 833,350 females), the sex ratio is 963 females per 1000 males and population density is 488 per sq. km; Balasore has population of 2,320,529 (1,185,787 males and 1,134,742 females) with a higher population density (610 per sq. km) and sex ratio is 927 females per male (Census, 2011).

1.1.3 Landscape of humanitarian aid in the region

The Disaster Management Act of India (Gol 2005) provides the overall policy framework and guides humanitarian NGOs to intervene in event of disasters is guided by the which was adopted as a policy

in 2009. In Assam and Odisha, the humanitarian aid landscape was unique. In Assam, the NGOs worked together under two consortia under ECHO to implement an early recovery programmes. Agency A, as part of the consortium led by Agency AA along with Agency CA, implemented the early recovery programme in Sonitpur and Morigaon districts. Agency A worked with their local partners: Agency B in Sonitpur and Agency C in Morigaon. In Sonitpur Agency B had limited experience in disasters but forged a new partnership with Agency A with a humanitarian mandate. In Morigaon, Agency C was a long-term DRR partner and was part of the 2007 floods response. They continued to engage with Agency A after the 2012 floods. ECHO funded another consortium led by Agency SC and other regional NGOs in Assam. Besides humanitarian partnerships and consortia, there were regional NGOs and civil society organisations undertaking development programmes, civil rights and conflict response in Assam.

In Odisha, the donor agencies – UK AID and ECHO – replicated the consortium-model for response and recovery. Under the UK AID programme, Agency CA and Agency SC were the respective leads for two separate consortia for emergency kits distribution for the affected population. The aim was to provide humanitarian assistance to cyclone- and flood-affected districts in Odisha. Agency A worked with the Agency CA-led consortium along with four other NGOs. Under the ECHO-funded consortia, Agency AA and Agency SC led two consortia to provide shelter, water and sanitation, food security and livelihoods support. Agency A worked with the Agency AA, CA and other NGOs. The local partner NGOs included Agency D in Puri, Agency E in Ganjam and Agency F in Balasore. These partners were long-term DRR partners with Agency A and had undertaken preparedness and evacuation measures once cyclone warnings were disseminated. These partnerships facilitated early and successful evacuation, efficient warehouse and logistics, relief and community mobilisation efforts in the districts.

1.1.4 Implementing institutions in the region

In India, there are a number of state institutions related to disaster management – national, state and district disaster management authorities, different line departments – Central Water Commission, Indian Meteorological Department, Public Health Engineering, Water Resources, Sanitation, Rural Development, Revenue and Disaster Management, Land Resettlement and Rehabilitation, and Public Works Department undertaking different functions before, during and

after disasters. In this thesis, Public Health Engineering Department (PHED) is closely followed as the key government body implementing national and state-level water supply and sanitation schemes and programmes (Section 5.5 and 6.5). Revenue & Disaster Management Department in Assam is in-charge of recovery and rehabilitation. Rural Development Department undertook water supply measures in rural Odisha and OSDMA coordinated reconstruction programme supported by World Bank-Asian Development Bank.

The public policy sphere in disaster management witnessed a landmark change in 2005, with the passing of Disaster Management Act, 2005 (GoI, 2005). It laid down the guidelines for establishment of National, State and District Disaster Management Authorities. NDMA was responsible for laying down policies, plans and guidelines for disaster management to ensure timely and effective response to disasters. SDMAs develop and implement the state disaster management plans, which include vulnerability in the region, capacity building, prevention and mitigation measures, and mainstream disaster risk reduction with development. In the districts, District Magistrate/Collector is the prime authority for disaster preparedness, response coordination and recovery. DDMA acts as the planning, coordinating and implementing body for disaster management and takes measures as per the District Disaster Management Plans.

ASDMA developed the Assam State Disaster Management Plan to ensure that all components of Disaster Management are addressed to facilitate planning, preparedness, operational, coordination and community participation (ASDMA, 2012a). It includes following aspects: 1) Prevention of danger or threat of any disaster, 2) Mitigation or reduction of risk of any disaster or its severity or consequences; 3) Capacity-building; 4) Preparedness to deal with any disaster; 5) Prompt response to any threatening disaster situation or disaster; 6) Assessing the severity or magnitude of effects of any disaster; 7) Evacuation, rescue and relief; 8) Rehabilitation and reconstruction (ASDMA, 2012a).

In Odisha, a number of changes were initiated after the 1999 super cyclone: Government of Orissa drafted a Disaster Management Bill for the state and inaugurated OSDMA (on 28 December 1999), which was tasked with dealing exclusively with disaster mitigation measures in the state (Ray-Bennett 2009). OSDMA's brief was to coordinate with local and international NGOs and multinational organisations during disasters, and implement disaster preparedness and mitigation measures.

1.2 Research Questions and Objectives

This interdisciplinary research explores the existing WaSH approaches, technologies, interventions and linkages during recovery.

To address this topic, the main research question in this thesis is:

How effectively do different approaches to water and sanitation facilities, and hygiene practices, during post-disaster recovery promote community resilience to disasters?

The question is refined further into three sub-questions:

1. How can the existing policies in WaSH and recovery be strengthened to incorporate resilience in WaSH? Furthermore, how can these policies be effectively translated into practice?
2. How can learning, knowledge, and participatory approaches help in translating the window of opportunity available during recovery into action?
3. How effectively do agencies facilitate the integration of emergency response with long-term development across different sectors?

A conceptual framework was developed, based on the review of literature on recovery, WaSH, and resilience thinking. The framework – WaSH during recovery – consisted of learning and knowledge, participation, integration and institutions as conceptual themes identified from existing literature on disaster resilience (Twigg 2007; Manyena 2006; Bahadur et al. 2010; Voss and Wagner 2010; Schilderman and Lyons 2011). The framework was further expanded based on interviews with experts in recovery and WaSH programmes (Annexure 5). After further modifications, I used the framework as a guide to develop data collection tools for gathering empirical data on WaSH during recovery and analysis. This research focuses on two disaster events in India, and analyses the post-disaster changes in WaSH systems during recovery, and response measures by households, communities, agency programming strategies and actions by local actors and government institutions. In Assam, I collected data during several visits from 2012-13. In 2012, I participated in emergency needs assessment commissioned by a UN agency. I first visited Solmari village in Sonitpur district when the floods occurred in 2012. In 2013, I undertook a scoping study with Agency A as a

volunteer. Agency A implemented their programme in Sonitpur and Morigaon districts. I undertook the main fieldwork as an independent researcher in August - October 2013 in Solmari and Boramari villages in Sonitpur and Morigaon respectively. Odisha was included as a supplementary case study when the Cyclone Phailin and floods occurred in 2013. I was deployed with Agency A from October 2013 - March 2014.

My association with Agency A in Assam and Odisha enabled me to access the disaster-affected areas, and to study the response and recovery efforts. In Odisha, I participated as a team lead for Agency A in Puri district for six months immediately after the cyclone. I visited the flood-affected areas in Balasore in March 2014, 6 months after the floods occurred. Coming from a humanitarian practitioner perspective, this research attempts to understand the practicalities of WaSH during recovery, and connects the existing theories and concepts. Accordingly, my role as a practitioner during this research has influenced the development of research questions, with an aim to address gaps in theories and practice. This research begins by developing a conceptual and theoretical understanding of WaSH during recovery, followed by empirical exploration using the above case studies. While undertaking fieldwork, the close association with the implementing agencies provided a critical perspective on what external agencies can achieve in terms of behavioural changes within the programme duration. As a practitioner, I have interacted with the affected communities, understood their recovery processes, and witnessed post-disaster changes. This unique position of a reflective practitioner has influenced how the research has progressed to identify gaps in concepts, theories and practices. Initially I wanted to investigate agency interventions to promote community resilience, which gradually evolved to understand how agencies recovered after disasters with or without external interventions to finally understanding how households change their behaviour practices in WaSH and link this knowledge to existing policies. This research interprets the empirical evidence in light of existing theories and concepts related to resilience, recovery and water and sanitation technologies.

1.3 Thesis Outline

This thesis is organised into eight chapters. Chapter 2 reviews literature on disaster recovery, and WaSH in development and emergency contexts. It provides an account of various perspectives and approaches in recovery. It identifies interdisciplinary themes to understand post-disaster changes

and impacts on WaSH systems. Chapter 3 describes approaches to resilience thinking in a post-disaster context. It develops a conceptual framework using systems thinking including themes – learning and knowledge, participation, institutional capacities and integration – identified from literature. Chapter 4 describes the research methodology and case study approach, using participatory research tools. It presents the ethical considerations, and the analytical strategy. Section 4.3 explains the rationale for anonymising the work of Agency A and other participating NGOs in this thesis.

Chapter 5 presents the empirical findings from Assam at various scales: the households, communities, local actors, and government and humanitarian agencies'. This chapter describes the changes over time in WaSH systems, and agencies' actions to influence these changes. It describes institutional capacities, and consortium-based approaches in Assam. Chapter 6 presents data from Odisha, of working with Agency A in the recovery programme. This chapter describes different perspectives of households, communities, local actors, government and humanitarian NGOs. It explains the integrated and consortium-based approaches in Odisha. Chapter 7 discusses the empirical findings from the case studies to answer the research questions. It reflects on the challenges in using the conceptual framework for data collection and analysis, and discusses emerging themes such as WaSH trajectories, gendered recovery processes and co-production of knowledge. The final chapter provides conclusions and recommendations, the theoretical implications of the findings, and contribution to knowledge in methodological, practical and policy aspects. This chapter also identifies issues for further research in WaSH during recovery.

Chapter 2: Literature review

This inter-disciplinary research explores the largely under-researched area of WaSH implementation during post-disaster recovery. This chapter reviews existing literature on recovery and WaSH (Water, Sanitation and Hygiene), to understand the theoretical development and practical evidence of relevant issues and approaches in WaSH and recovery. Section 2.1 reviews recovery literature and understands disaster recovery as a process, and the context, objectives and approaches used in recovery. Section 2.2 focuses on WaSH: approaches, interventions and challenges in post-disaster WaSH programmes.

2.1 Post-disaster recovery

Disasters occur as a product of natural events and the social, political and economic environments (Wisner et al., 2004). Disaster is defined as ‘A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources’ (UNISDR 2009 p.9). When disasters occur the underlying fractures of discrimination, marginalisation and political neglect are magnified (Oliver-Smith 1996). The Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030 identifies recovery as a priority action, stating that disaster preparedness for resilient recovery is essential to ‘Build Back Better’ (UNISDR 2015). Recovery is a complex, multi-faceted concept (Olshansky and Chang 2009; Chang 2010), but is the least understood phase of the disaster management cycle (Mileti 1999).

2.1.1 Multidimensionality of recovery

There are inconsistencies and confusion regarding the usage and meaning of the term ‘recovery’ (Dynes et al, 1989; Quarantelli, 1989). Quarantelli (1999) mentions frequently used terms to indicate various aspects of recovery as follows:

- Reconstruction (post-impact rebuilding)
- Restoration (re-establishing pre-disaster physical and social patterns)
- Rehabilitation (restoration to include more people and things, perhaps to an improved level than pre-disaster)
- Restitution (restoration of the rightful claimants of owners and implies legal actions)

- Recovery (attempting to bring some level of acceptability to the post-disaster situation) (Nigg, 1995; Quarantelli, 1999; Mileti, 1999; Sword-Daniels 2014)

Disaster response is a more extensively researched phase than disaster recovery (Mileti, 1999 p.220). It includes emergency shelters, search and rescue, medical assistance, firefighting, debris removal, needs and damage assessment and relief assistance (Mileti, 1999; Sphere, 2011). Post-disaster response entails action or assistance based on core humanitarian rights,² standards and principles of humanity, neutrality, impartiality and independence (OCHA 2012). The humanitarian imperative binds agencies to provide basic services such as food and nutrition, water, sanitation, education, shelter, protection and health (Sphere 2011). Disaster recovery 'often seems to imply attempting to and/or bringing the post disaster situation to some level of acceptability. This may or may not be the same as the pre-impact level' (Quarantelli, 1999, p. 3). It is viewed as a process that encapsulates all activities, processes and planning that follow any disaster, including short-term activities to restore vital support systems and longer-term activities to return to normal life (Dynes and Quarantelli 1989; Nigg 1995; Mileti 1999; Quarantelli 1999; Rathfon 2010). It encompasses decisions about restoration and reconstruction: how those decisions are made and by whom; what are the consequences of those decisions on the community; and who benefits and who does not benefit from those decisions (Nigg 1995). Recovery also includes aspects of healing, and moving towards a healthy state and social change (Dynes and Quarantelli 1989).

The different conceptualisations of recovery exist due to the gaps in expectations between what Cannon (2008) terms as the 'outsiders' – those who come to help – and 'insiders' – who are affected by disasters. The outsiders often prioritise natural hazards higher than 'insiders', who may not distinguish between shocks or daily life struggles (Cannon 2008). Recovery literature draws attention to the perspectives of the affected people who experience recovery differently (Mileti, 1999). Such studies conceptualise recovery to encompass perceptions, expectations and struggles of the affected communities, and determines their thresholds for recovery (Voss and Wagner 2010; Wisner and Gaillard 2012; Shrestha and Gaillard 2015).

² The Humanitarian Charter define basic right for the welfare of those affected by disasters or war, to right to life with dignity, the right to receive humanitarian assistance and the right to protection and security.

2.1.2 Context of Recovery

The conventional approach to disaster recovery has been critiqued as band-aid relief that perpetuates or covers-up the underlying causes of disaster, without breaking the cycle of recurring disasters (IFRC, 2001). Humanitarian relief and aid provision should be reframed to prioritise local principles and values (Rose et al. 2013). Recovery is perceived as a complex and extended process from an outsider's perspective (Barenstein, 2008; Cannon 2008, Davis, 2011). It operates within an emotional, reactionary, time-sensitive, expensive and politically charged atmosphere (Natural Hazards Centre, 2001, p.2-2). There is chaos, due to inherent confusions, conceptual vagueness and involvement of different actors with varied interests (Lizarralde et al. 2009). These challenges place conflicting demands on limited available resources and external funds (ibid). Enormous local and external resources are required to support the recovery process (Lizarralde et al, 2010) and capacities of those involved in the process (Kenny 2005). The chaotic atmosphere results in duplication of agency efforts as witnessed after the 2005 Kashmir earthquake (Nabi 2014). The problem of ineffective coordination is seen in all the phases of disaster response – rescue, relief, and rehabilitation (Raju 2013).

Nigg (1995) found that community response to disasters has consequences for families, businesses, and local government. In Bangladesh, social relations and vulnerabilities of those living in hazardous environments in the floodplains and coastal areas were challenged and reproduced by the gendered and classed coping strategies and adaptation measures (Sultana 2010). In Sri Lanka, tsunami-affected communities reorganised their lives, strategically and subjectively to fit the categories introduced by governmental and non-governmental agencies for aid distribution (Thurnheer 2009). Barenstein (2015) undertook longitudinal study of recovery from the 2001 earthquake in Gujarat, where she examined people's strategies and patterns of adaptation after relocation. She argues that affected populations are not passive recipients of external agencies' often culturally insensitive projects, instead they transform the externally imposed notions of appropriate housing to meet their cultural- and livelihood-specific needs (Barenstein 2015).

Recovery becomes a lengthy and extended process because restoring critical services and rebuilding assets could take months or even years (Natural Hazards Centre, 2001). Existing studies perceive recovery as a non-linear and multidimensional process. There are three perspectives regarding temporal dimensions of recovery processes: techno-centric approach, social constructionism and

systems approach. The techno-centric approach to natural hazards, first elaborated by Haas et al. (1977), provided an initial comprehensive view of reconstruction. They claimed that 'the reconstruction process is ordered, knowable, and predictable' (p. 261), and suggested phased planning to first meet the immediate needs, followed by restoration, then replacement and lastly commemorative reconstruction (Haas et al. 1977). The technocratic approaches emphasised preventive and mitigation aspects of disaster management (Mileti 1999; Olshansky and Chang 2009). This approach was critiqued by vulnerability studies that contested the linearity of phases and event-focused actions from a social and anthropological perspective (Oliver-Smith 1996; Cannon 2008). Davis (1978) argues that recovery is not a linear process with discrete stages and end products; instead community recovery activities are incremental in stages and progress is gradual, depending on their capacities and priorities. In the countries affected by the 2004 Indian Ocean Tsunami, physical recovery occurred in stages over the 10 years but challenges for psychological recovery remain to be addressed (Shaw 2015).

The more recent systems approach to recovery planning focuses on the linkages and interactions between elements and impacts of disaster shocks on these sub-components (Sword-Daniels 2014). The systems approach can be used to understand temporal and spatial aspects of recovery. It includes multiple perspectives, which accordingly define recovery as a household, economic, planning, management or a housing problem (Olshansky and Chang 2009). These perspectives emerge from the number of actors involved in recovery including communities, governmental agencies, non-governmental organizations (NGOs), and private industry (Meskinazarian 2011; Rathfon 2010; Sword-Daniels 2014; King 2015). Effective coordination becomes challenging when multiple actors are involved; establishing common interests, goals and plans of action becomes a challenge for 'harmonisation' of national and international humanitarian aid (Kenny 2005, p.212). Post-tsunami research in Tamil Nadu emphasises the role of the government, knowledge networking, and organisational mandates and goals for engaging with donors in long-term recovery (Raju and Becker 2013).

The literature draws attention to the fact that recovery occurs within the existing socio-economic conditions, cultural and geographical factors. Vulnerability studies question the '*naturalness*' of disasters because disasters are a product of social, political and economic environments (Wisner et al. 2004, p.6). The poor in developing countries who are differentially impacted by the hazards and

development processes often live or work in dangerous and hazardous locations (Wisner et al., 2004). There are differential impacts based on race, ethnicity, class, and gender (Oliver-Smith 1996). These differences depend on pre-existing socio-economic and environmental inequalities and geographical unevenness of disaster impacts (Walker et al. 2006). The traditional Aeta communities in the Philippines after the 1991 Mt Pinatubo eruption had differential capacities and the resultant cultural changes were influenced by different hazard types, availability of space to relocate, pre-disaster socio-cultural vulnerability and government's post-disaster rehabilitation policies (Gaillard 2006). Relocation was another policy approach during recovery: after the Yungay, Peru earthquake and avalanche in 1970, processes of relocation and resettlement decisions were insensitive to communities' attachments to environment and cultural values, and increased community's dependence on aid (Oliver-Smith 1979).

In her comparative study of post-tsunami Tamil Nadu and post-earthquake Gujarat, Barenstein (2008) found that top-down contractor-driven approach to reconstruction was insensitive to environmental and socio-cultural aspects, while the owner-driven approach allowed communities to choose between different relocation and resettlement strategies, construction approaches and supporting agencies. In the 2010 Haiti earthquake, social capital enhanced access to shelter-related resources for those with connections, but accentuated pre-existing inequalities and created new inequalities among displaced Haitians (Rahill et al. 2014). Schilderman (in Lyons et al., 2010) rightfully claims that disaster reconstruction does not take place in 'vacuum' but within the context of pre-disaster socio-economic development (p.33). Hence understanding the pre-disaster development context and policies is essential for planning recovery efforts and understanding the potential socio-economic impacts of decisions taken during recovery.

Recovery programmes are lengthy and resource-extensive, and struggle to strike a balance between time, speed, and quality concerns. During recovery a number of trade-offs in decision-making are made based on programme proposals and contextual needs. The urgent need for action in a short span of time proves counterproductive to sustainable recovery (Barakat, 2003). Recovery agencies struggle to strike a balance between the quality of their programmes and the quantity of their interventions and achievements because of funding constraints, programming timeframes, organisational capacities and urgency of immediate action (Twigg 2006). Speed is important for rapid programme delivery, repairing and rebuilding of infrastructure (Chang 2010; Rathfon 2010).

Greater speed and quality of recovery depend on productive intergovernmental relationships, effective use of resources and better decision making at community level (Rubin 1985). Agencies involved in post-tsunami reconstruction in Aceh, Indonesia were blamed for delayed programming because programmes were designed on unrealistic initial expectations, without factoring the time required for community mobilisation, for resolving land issues, and establishing offices and warehouses, and logistics (da Silva, 2010). Delays occur due to structural barriers like shattered economic and political structures, and organisational barriers like relief culture, competency, knowledge, attitudes, political will and security issues (IFRC, 2001). Hence, the existing evidence shows that current approaches in recovery have shortcomings.

2.1.3 Disaster recovery objectives

What then are the objectives of the recovery process? Would bringing about 'normalcy' include reconstructing conditions that made the population vulnerable to the impact of disaster in the first place? A "good" disaster recovery is holistic recovery, where the community's best interests are considered (Natural Hazards Centre, 2001, p.2-2) or include sustainability (Mileti 1999; Rathfon 2010). Studies have found that communities try to re-establish themselves post-disaster in ways that are familiar to them, as in pre-disaster patterns of social networks, livelihoods and living (Davis, 1978; Twigg, 2006). The resulting continuity and familiarity is essential, because it enhances their psychological recovery (Mileti, 1999). This section describes three key conceptualisations and objectives of recovery from recovery literature: to build back better (BBB), to link relief, recovery and development (LRRD) and to maximise the window of opportunity.

Bill Clinton, while outlining the response strategy as the UN Secretary-General's Special Envoy for Tsunami Recovery, argued that "'building back better" (BBB) means making sure that, as you rebuild, you leave communities safer than they were before the disaster struck' (Clinton 2007, p.1). For this required capacity building of institutions; expanding access to health and education services; reducing poverty and strengthening livelihood security; advancing gender equality; empowering and opening up spaces for civil society experiences (Fan 2013). In recovery, 'resources, influence and political strength tend to weaken when the memory of the disaster begins to vanish' (Davis 2007 p.3). Recovery planners should aim to address underlying requirements of employment, economic opportunity, sustainable livelihoods, resumption of food supplies, reconstruction of public infrastructure, and community vitality (Davis 2007). People-centred rebuilding contributes to

breaking the cycle of poverty and dependence and reduces people's vulnerability to disasters through renewed thinking in the fields of housing, participation and livelihoods (Lyons et al. 2010).

Fan (2013) argues that BBB approach does not provide the tools to help address critical questions, and the criteria against which agencies can assess the pros and cons of adopting this approach. In her doctoral study of Haitian response following the 2010 earthquake, King (2015) found that the over-enthusiastic BBB approach disregarded rental support options as a temporary, non-sustainable measure, and overlooked the value of rental support in market stimulation and encouragement for owner-driven repair and reconstruction for the new rental market demand. The BBB approach needs planning, capacities and investments in contextually relevant measures (King 2015). Fan (2013) found that during humanitarian and reconstruction programmes, agencies did not have the capacities or the organisational mandate to address structural issues. Others vouch for 'building back safer', which provides a clearer goal for post-disaster settlement (Kennedy et al. 2008, p.33).

A key question raised in this debate is: *Whom do we build back better for?* Irrespective of the term used – safer or better – the concept should move beyond its emphasis on the physical aspects of reconstruction, shelter and housing provided by external actors. The contestations of power and politics of recovery and integration of common objectives across silos of humanitarian and development programming pose challenges for recovery (Mitchell and Harris 2012). This research argues that a renewed BBB approach could consider needs and aspirations of the local communities and their vision for recovery that link from pre-disaster to post-disaster and thereafter. Humanitarian assistance should change its approaches to build local resilience and reduce vulnerability to develop communities that are capable of bouncing forward after a disaster through transparency, accountability and participation from local communities (Rose et al. 2013).

The normative LRRD discourse indicates recovery is often governed by diverse and inharmonious normative aims (Christoplos et al. 2010). LRRD emerged as an important idea during the analysis of the food crises in Africa in the 1980s (IFRC, 2001). There was a growing realisation that the 'grey zone' between 'phases' of assistance was consistently under-funded (Ramet 2012, p.4). The early concept of a linear 'continuum' from relief to development evolved into a 'contiguuum' so that rehabilitation and development can occur alongside relief activities (Fan 2013, p.1). There are challenges for achieving this, due to lack of definitional and conceptual clarity and consensus of

LRRD, and challenges for addressing macroeconomic and political factors, and realising governance and institutional changes (Buchanan-Smith and Maxwell 1994). There is an operational gap between relief and recovery due to short-term organisational mandates and different interests and capacities to manage the transition (Lloyd-Jones 2006). To achieve LRRD, clarity among different stakeholders about their roles and responsibilities in relief and development is crucial, but there are rigid boundaries between old institutions, finances, and attitudes in development and relief (Twigg, 2006). In the case of Hurricane Mitch in Nicaragua, aid response and recovery efforts were driven by the broader trends, including household, community and government initiatives and the wider economic and market-related context (Christoplos et al. 2010).

To understand LRRD, this research explores linkages in the recovery processes at the household, community, government and NGOs from pre- to post-disaster situations. Studies have investigated these linkages and have offered various approaches and solutions to bridge these gaps through different approaches: pre-disaster recovery planning (Becker and Sauders 2007), reframing risk through disaster mitigation and preparedness (Christoplos et al. 2001), sustainable hazard mitigation (Mileti 1999) and resilience approaches to achieve LRRD post-disasters (Manyena 2009; King 2015). DRR measures and systems for LRRD can be instituted through government and NGO action (Lloyd-Jones, 2006). There is little evidence of how agencies make the transition from relief to recovery given the existing barriers and complex nature of recovery (King 2015).

Disaster studies claim recovery provides opportunities for changing pre-disaster conditions (Mileti, 1999; Rubin, 2009; Chang et al., 2011). The opportunity to spearhead changes and improve the conditions that led to disaster in the first place is provided due to the influx of resources, media and international attention, and renewed interest (Christoplos 2006). This idea that disasters represent an opportunity for change and renewal is not new: recovery from 1923, Great Kanto earthquake aimed to maximise this 'window of opportunity' to trigger wider social reform processes (Fan 2013, p.2). However little guidance is available on how to maximise this window of opportunity. 'Theory of change' is used as an approach for designing and evaluating social programmes, and to elaborate and document views on the longer-term changes sought, the changes required and why, the context for change and the actors, and how the development programme's strategy, activities and outputs could contribute to long-term change (Vogel 2012). For post-disaster programmes, 'contribution to change' is used to document the household level changes over time, identify how effectively

agencies promoted recovery, and the extent to which resources, assets, livelihoods and well-being have been strengthened in recovery (Few et al. 2013).

From the policy perspective, disasters act as focussing events, leading to a rethink in policy initiatives, public group mobilisation and agenda setting (Birkland 1998). Focusing events serve as important opportunities for politically disadvantaged groups to champion messages that had been effectively suppressed by dominant groups and advocacy coalitions. Such events can therefore be an important tool for groups seeking policy change (ibid). A focusing event is an event that is sudden; relatively uncommon; can be reasonably defined as harmful or revealing the possibility of potentially greater future harms; its harms that are concentrated in a particular geographical area or community of interest (Birkland, 1998 p.54). Disasters can catalyse structural and irreversible changes by creating new conditions and relationships within environmental, socioeconomic and political structures, institutions and organisations (Birkmann et al. 2008). The resultant changes - positive or negative - provide opportunities to push policy agendas, initiate structural changes and increase participation (Lyons et al. 2010; Meskinazarian 2011). Recovery planning poses unique challenges for practitioners and researchers, as time compresses, stakes increase, additional resources flow, and public interest is heightened (Olshansky and Chang 2009). The concept of the rare but brief window of opportunity is closely associated with effecting lasting change, but how can local governments effectively meet the time-sensitive needs of housing, economic and social recovery (Olshansky and Chang 2009)?

This discussion on change emphasises event, action and response: how change is manifested, who effects change and what is the response of each actor in response to the event. Manyena (2009) discusses two approaches to social change: the radical or conservative and non-interventionist approaches. In the former, communities act as change agents and are empowered to transform institutional and legislative policies, while in the non-interventionist approaches the practitioners' capacities are strengthened for working within the status quo (Manyena 2009 p.238). Birkland et al. (2008) argued that changes were formal or informal in nature, and were proactive and could also be slow or rapid, linear or non-linear, planned or unplanned and may manifest in many aspects across society. The evidence is not adequate to demonstrate how to maximise the window of opportunity and bring about transformational changes. Disaster recovery is the product of a

cumulative set of decisions taken over long periods, and the choices and processes are the focal point for potential change (Comfort et al. 1999).

There is little research on the characteristics of longer-term changes after disasters (Birkmann et al. 2008). Post-disaster changes occur after small-scale and regular disasters; these are neglected depending on frequency, magnitude, uncertainty, and the reactive response to each disaster (Wisner and Gaillard 2012). There is no resolution or reduction measures after chronic hazard conditions – recurring floods, landslides and erosion, lack of adequate access to water and sanitation, and malnutrition – leading to failure of sustainable development practices and disaster risk reduction (Guppy and Twigg 2013). Voss and Wagner (2010) found that learning opportunities were available after small-scale disasters, through participation and experiential learning (Voss and Wagner 2010). However, Birkland et al. (2008) believed that small-scale disasters do not lead to significant changes. Researchers have argued that the amount and quality of recovery research is not adequate for meeting current and future recovery planning and implementation challenges (Rubin 2009). There is very little evidence of how changes in recovery can be achieved, measured and replicated under different conditions, independent of scale, agent, magnitude or response to disasters (see Table 2.1).

Table 2. 1: State-of-art of recovery literature on objectives and approaches (Source: Author)

No	Themes: Objectives and approaches	Articles/Studies
1	Community response: diversity, knowledge and self-organisation	(Berkes 2007)
2	Community resilience: Capacity building	(Manyena, 2006)
3	Technological/Housing: Local building practices for safer construction practices	(Twigg, 2006; da Silva, 2010)
4	LRRD: DRR and Mitigation	(Christoplos, 2006; Manyena, 2006; Lloyd-Jones 2006; Davis, 2007)
5	Resource Influx and improved access	(Lizarralde et al., 2010; Chang et al., 2011)
6	Sustainable Hazard Mitigation: Availability of external financial and technical assistance	(Mileti, 1999)
7	Sector: Livelihood and employment	(Twigg 2006; Lyons et al. 2010)
8	Technology: New appropriate technology-culturally acceptable and relevant to local vernacular technology	(Jigyasu, 2010)
9	Organisational learning: Structural and functional changes and self organisation	(Quarantelli, 1989, Alesch, 2005)
10	Housing: re-establish lost assets, better accommodation	(Barakat, 2003)

2.1.4 Recovery approaches and strategies

The existing literature focuses on conventional approaches to recovery through shelter, livelihoods and critical sectors, and use of participatory approaches for recovery. Holistic and sustainable recovery allows communities to choose from a range of goals and aspirations to envision their recovery priorities (Natural Hazards Centre 2001). The planning approaches emphasise sustainability, hazard mitigation and smart growth through comprehensive plans addressing all relevant and necessary sectors that impact community lives, and sustain changes post-disasters (Natural Hazards Centre 2001). Community recovery can be organised into eight sectors: demographics, housing, critical infrastructure, natural environment, economy, education, health and well-being, and community identity (Rathfon 2010 p.12). Nigg's (1995) study of family recovery processes found that the needs and types of families varied depending upon their access to resources and reliance on social capital. The focus on household or community provides a microscopic view, while a holistic and systems view provides understanding of various needs, interconnections and interdependence, which should be developed in sync with each other during recovery (Alesch et al., 2009). Although the primary focus of this research is in WaSH systems (section 2.2), the review includes studies on housing, livelihoods and critical services to explore the interdependencies and primary priorities at the household level for safe shelter and its relation to WaSH and health systems and livelihood opportunities.

Most literature on recovery focuses on housing reconstruction including emergency and temporary sheltering options (Davis 1978; Quarantelli 1991; Johnson 2007), implementation mechanisms (Johnson 2002; Barenstein 2008; Jigyasu 2010; Rathfon 2010) and shelter reconstruction programming (Barakat 2003; Lloyd-Jones 2006; da Silva 2010; Jha et al. 2010). Quarantelli (1991) proposes housing recovery after a disaster occurs in four stages: (1) emergency shelter, (2) temporary shelter, (3) temporary housing, and (4) permanent housing (Quarantelli 1991). Shelter studies have reviewed approaches, technologies and strategies such as owner-built, contractor-driven, subsidised or participatory approaches (Barakat, 2003; Barenstein, 2010; da Silva, 2010). Studies on shelter and reconstruction compare the traditional knowledge and construction practices with modern construction techniques for demonstrating resilience to earthquakes (Jigyasu 2010; Audefroy 2011). Although the above studies engage with critical debates on housing and reconstruction, they lack a holistic understanding of different sectoral needs during recovery, and do not provide longer-term empirical evidence to guide complexities and challenges posed by

funding and timescales, and approaches to overcome programmatic barriers for LRRD and BBB. This chapter does not exhaustively review these studies because they did not help address the research question directly, and were not relevant to the investigation of approaches in WaSH during recovery.

Vulnerability studies exploring disaster impacts and economic decline, have argued for a livelihoods approach to reduce vulnerabilities (Anderson 1985). Lyons et al. (2010) argue that rebuilding people's livelihoods is equally important as building safer houses. There are studies on cash transfers for shelter, cash for work (CFW), or food for work (FFW) projects that provide labour opportunities through participatory projects that are externally funded (ACF 2009). Support to livelihoods in disaster response is still a relatively new approach (Kennedy et al. 2008; Uy et al. 2011). It is largely confined to support for agriculture and food security - for example, distribution of cash, seeds and tools as part of agricultural support packages - or to providing short-term assistance through food for work (FFW) and cash for work (CFW) projects (Twigg 2006). The emergency food programming and livelihoods strategies adopted by agencies in recent years have highlighted that incentive-based activities like CFW and FFW programmes ensure job opportunities for the affected communities, and help in kick-starting the economy devastated by the impact of emergencies (Harvey et al., 2010; Sphere, 2011). These cash and material incentives influence community participation, decision-making and power relations within communities (Manyena, 2006).

The livelihood initiatives such as cash transfers programme had a positive impact on food access and reducing vulnerability in the famine-affected Tillabery region, in Niger, but did not contribute towards longer lasting impact on households' food security status (Tumusiime 2015). Uy et al. (2011) found that poor households and communities in Albay province in the Philippines faced challenges of limited access to alternative livelihoods and income opportunities. Post-tsunami research in Nagapattinam found that merely distributing boats to fishing groups for restoring livelihoods failed to improve equity or changing societal norms (Jordan et al. 2015). The implementing NGOs left the disaster-affected area after project completion, and did not understand the longer-term implications of their livelihood interventions (ibid).

There are studies that evaluate performance of critical services impacted by disasters. The lifelines or critical infrastructure systems that support activities, such as electric power, health, natural gas, water, telecommunications, and transportation are essential for holistic recovery, because without

energy and water, households are forced to relocate (Olshansky and Chang 2009). Recovery involves much more than simply restoring the built environment, as communities struggle to achieve viability in the newly-emerging environment within which they exist, and, to the extent they are able, to shape that environment (Alesch 2005). Rebuilding and strengthening health systems is an important humanitarian intervention, requiring effective engagement and planning for service delivery, production, distribution and financing (Newbrander et al. 2011). A survey of recovery indicators in Nagapattinam, found that community infrastructure, including water systems, sanitation, roads, and other amenities were important factors in long-term recovery outcomes (Jordan et al. 2015). Although studies have demonstrated impacts on specific sectors, the understanding of comprehensive recovery processes across all sectors is missing in the literature.

Participatory approaches in reconstruction are important for exploring the linkages between disasters and development (Lyons et al., 2010). Davis (2007) recommends participation for successful recovery and sustainability of programmes, as people are more open to changes for betterment post-disasters. Agency guidelines and frameworks emphasise the role of communities in providing sustainable solutions (UNDRO 1982; Practical Action 2010; Sphere 2011). Community involvement in reconstruction programmes strengthens their physical, emotional, practical ability to resist disasters, and facilitates reconciliation, improves institutional resources and develops their social capital (Barakat, 2003). Participatory processes involving vulnerable people help to identify and prioritise urgent needs and vulnerable groups (Twigg 2006). The process itself may be as important as the outcome of participatory approaches (Mileti, 1999, Manyena, 2009). During reconstruction the challenges of scaling up and overcoming time and resources pressures can be overcome through participatory and inclusive approaches in housing and livelihoods (Lyons et al. 2010; Schilderman and Lyons 2011).

There are challenges in employing participatory processes in the immediate aftermath of disasters because the urgent concerns are to address immediate basic needs (Natural Hazards Centre, 2001). Davidson et al (2007) used a systems approach to compare four case studies of post-disaster housing reconstruction projects (one each in Colombia and in El Salvador, and two in Turkey). This study shows that there is a continuum of possibilities for participation as labourers on one end, or as active decision-makers and project managers on the other end, which is rarely obtained (see Figure 2.1). Often community capabilities are ignored in recovery programmes, therefore community

participation remains a myth that is hardly put into practice in the right manner to ensure resilience (Davidson et al. 2007).

Participatory approaches that empower people in important decision-making roles or offer collaboration with communities promote community control over the project, whereas beneficiary consultations on needs and wants (with no assurance that these concerns will be taken into account), and merely informing them about the programmes cannot really be classified as 'participation' (Davidson et al. 2007). Twigg (2006) advocates against using meagre consultations with affected populations, as they do not provide long-term solutions or success and eventually communities revert to unsafe conditions. Agencies should involve, engage, and empower communities to undertake reconstruction activities, so that their aspirations and notions of resilient communities are realised and they are able to contribute with their knowledge and skills (Jha et al., 2010).

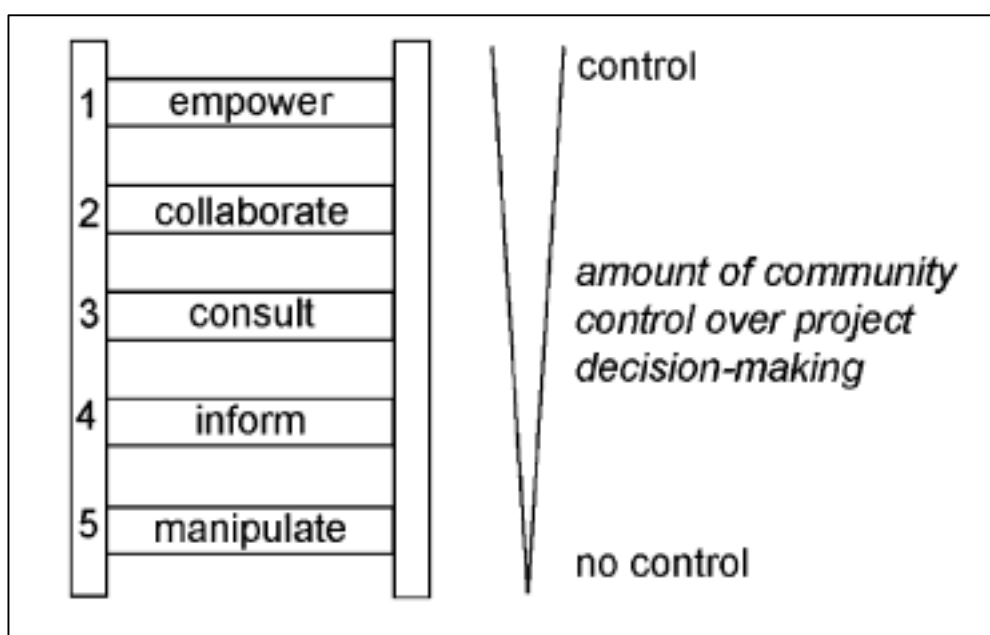


Figure 2. 1: Ladder of community participation (Davidson et al. 2007)

To meet recovery objectives, it is essential that participation of all relevant actors in the decision-making is ensured and their roles and responsibilities are defined, including the local, regional and national government, civic bodies and implementing agencies (Barenstein 2010; Alexander 2012; Sword-Daniels 2014). Studies have analysed governance mechanisms during recovery (Barenstein 2010; Meskinazarian 2011; Alexander 2012), the role of civil society in reconstruction following

earthquakes in Turkey (Johnson 2011); and formation of new authorities to oversee reconstruction in Italy and India (Barenstein 2010; Alexander 2012). Gujarat State Disaster Management Authority was formed after 2001 earthquake, and the Earthquake Reconstruction and Rehabilitation Authority was constituted after the 2005 earthquake in Pakistan. It is argued that community is not a homogenous identity: instead there are diverse interests, needs and capacities, and underlying aspects of power and politics in decision-making, which often result in conflicts delaying decisions and affecting the pace and impact of reconstruction (see Jha et al. 2010; Barenstein 2010; Fan 2013).

2.2 Water, Sanitation and Hygiene

WaSH collectively refers to service delivery and programming for water and sanitation facilities, and hygiene practices. In this research, water indicates research and practice around water sources and supply, treatment and use; sanitation refers to defecation practices and excreta disposal mechanisms; and hygiene includes practices related to handwashing, sanitation, food and water handling, environmental and personal cleanliness, and menstrual hygiene. Hygiene Promotion (HP) or Public Health Promotion (PHP) refers to community mobilisation and participation, information, education and communication (IEC), behavioural change communication (BCC) and hygiene kit distribution (Bastable and Russell 2013). WaSH literature includes development and humanitarian/emergency WaSH, environmental and public health.

2.2.1 Access to Water, Sanitation, and Hygiene

More than 700 million people lack access to improved sources of drinking water and more than one third of the global population – some 2.5 billion people — do not use an improved sanitation facility, and of these 1 billion people still practice open defecation (WHO/UNICEF 2014). An estimated 4 billion cases of diarrhoea occur each year, causing 1.8 million deaths mainly among children under five years of age, due to unsafe drinking water, poor sanitation, and poor hygiene (Lantagne and Clasen 2012). There are stark disparities across regions, between urban and rural areas, and between the rich and the poor and marginalised (WHO/UNICEF 2014). Governments and NGOs are looking for solutions to tackle the development problem of one billion people defecating in the open, address behaviour change and monitor progress (Wijesekera and Thomas 2015).

The Millennium Development Goals (MDG) related to drinking- water and sanitation (MDG 7, Target 7c) aims to: “Halve, by 2015, the proportion of people without sustainable access to safe drinking-

water and basic sanitation” (WHO/UNICEF 2014). With the renewal of development goals in 2015, international donors and agencies are reevaluating investments in WaSH to measure access and monitor progress (Sparkman 2012; Pritchett et al. 2013). Access to drinking water is measured by the proportion of a population using an improved drinking-water source: a source that, by nature of its construction, adequately protects the water from outside contamination, in particular, from faecal matter; while unimproved drinking water sources include unprotected dug wells, unprotected springs, surface water, vendor-provided water, bottled water or water delivered by tanker (WHO/UNICEF 2014). Access to sanitation is measured by the percentage of the population using an improved sanitation facility, which hygienically separates human excreta from human contact including sewer connections, septic tank systems, pour flush latrines, ventilated improved pit latrines or a pit latrine with a slab or covered pit (ibid). Unimproved sanitation facilities include pit latrines without slabs or platforms, open pit latrines, hanging latrines, bucket latrines and open defecation (ibid).

The spread of water-related diseases depends on environmental conditions and human behaviour that determine control and prevention of diseases (Connolly et al. 2004). Studies on water and sanitation-related improvements evaluated their impacts on diarrhoeal and other infections (Esrey et al., 1991). It was found that child mortality fell by 55%, which suggests that water and sanitation have a substantial impact on child survival, and sanitation facilities decrease diarrhoea morbidity and mortality (Esrey et al. 1991). From the public health and epidemiological perspectives, provision of WaSH impacts population health outcomes, economic benefits and livelihood opportunities (Connolly et al. 2004). Systematic review and meta-analysis impact study shows that development interventions in drinking water, sanitation facilities, and hygiene practice improvements significantly reduced the risks of diarrhoeal illnesses (Fewtrell et al. 2005).

Access to water and sanitation is a *sine qua non* for the fulfilment of basic human rights (UN 2002). In his discussion of the concept of a right to safety for mainstreaming DRR in development, Twigg (2003) states: ‘Everyone has the right to the highest attainable standard of protection against natural and man-made hazards’ (Twigg 2003 p.2). The right to water and sanitation forms an integral part of a right to safety and helps in improved accountability, increased focus on marginal and vulnerable groups, increased participation in decision-making and enabling individual and community empowerment through sanitation (COHRE et al. 2007). Human right to water is

indispensable for leading a life in human dignity and for realisation of other human rights, particularly the rights to life, and to adequate standard of living, housing, food and health (UN 2002).

In 2002, the UN Committee on Economic, Social and Cultural Rights declared water as a human right whereby all individuals are entitled to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses (UN 2002). It includes affordability, non-discrimination, inclusion of vulnerable and marginal groups, access to information, participation and accountability (UN 2002). In 2010, the UN General Assembly and UN Human Rights Commission declared that the human right to safe drinking water and sanitation is derived from the right to an adequate standard of living, and inextricably related to the right to the highest attainable standard of physical and mental health, as well as the right to life and human dignity (UN 2010)³. General Comment No. 15 states that: 'States parties should take steps to ensure that: Groups facing difficulties with physical access to water, such as victims of natural disasters, persons living in disaster-prone areas are provided with safe and sufficient water.' (UN 2002 p.7)

The human right to water supply and sanitation has been recognised by government treaties and legislation, therefore obligating countries to chalk out national strategies and plans to ensure these rights are realised (WHO/UN-Water 2012). The treaties related to water are:

- i. **Universal Declaration of Human Rights (1948)**, in its Article 25, clearly states that everyone has a right to 'a standard of living adequately for health and well-being' including food and housing, and access to water (UN 1948).
- ii. **International Covenant on Civil and Political Rights (1966)** specifies a number of rights which are essential for fulfilling the need to access to water, implying mainly that no person can be deprived of their own means of subsistence and that every human being has inherent right to life as mentioned in Article 6 (UNHCR 1966).
- iii. **International Covenant on Economic, Social and Cultural Rights**, too recognises this right to water implicitly in its articles 11 and 12, as a right to adequate standard of living and right to the highest attainable standard of physical and mental health (COHRE et al., 2007).

³ The resolution was adopted during the 64th session of the UN General Assembly on 3rd August 2010

- iv. The **Convention for Rights of Children (1989)**, article 24, states that children have a right to the highest attainable standard of health, guaranteed *inter alia* through the provision of adequate and clean drinking water (Unicef 2011).
- v. The **United Nations Convention on the Rights of Persons with Disabilities (2006)** requires 'equal access by persons with disabilities to clean water services, and to ensure access to appropriate and affordable services, devices and other assistance for disability-related needs' (COHRE et al. 2007 p.70).

In humanitarian contexts, WaSH minimum standards and indicators for delivery are developed under the Sphere Project (McDougal and Beard 2011). Sphere Standards (the Humanitarian Charter and Minimum Standards in Disaster Response) outline humanitarian principles, standards of service delivery and indicators (Sphere 2011). These are rooted in rights-based and people-centred approaches (Brown et al. 2012); with useful parameters to ensure adequate access, safety and accountability measures in emergency programming (McDougal and Beard 2011). The minimum standards for water supply, sanitation and hygiene promotion (WaSH) are a practical expression of the shared beliefs and commitments of humanitarian agencies, and of the common principles, rights and duties governing humanitarian action set out in the Humanitarian Charter (Sphere 2011).

The key criteria to ensure the human right to water and sanitation are presented in Table 2.2 (Greene 2014, p.6).

Table 2. 2: Criteria of the Human Right to Water and Sanitation (Source: Greene, 2014)

Key principles	Description
Sufficient	Water supply and sanitation must be continuous and sufficient for personal and domestic uses. This includes drinking water, personal sanitation, washing of clothes, food preparation and personal and household hygiene

Safe	The water required for personal or domestic use must be safe, therefore free from micro-organisms, chemical substances and radiological hazards that constitute a threat to health. Measures of drinking water safety are usually defined by national and/or local standards. WHO's Guidelines for drinking-water quality provide a basis for the development of national standards that, if properly implemented, will ensure the safety of drinking water. Everyone is entitled to safe and adequate sanitation. Facilities must be situated where physical security can be safeguarded. Ensuring safe sanitation also requires substantial hygiene education and promotion. This means toilets must be available for use at all times of the day or night and must be hygienic; wastewater and excreta safely disposed and toilets constructed to prevent collapse. Services must ensure privacy and water points should be positioned to enable use for personal hygiene, including menstrual hygiene.
Acceptable	Water should be of an acceptable colour, odour and taste for personal or domestic use. All water and sanitation facilities and services must be culturally appropriate and sensitive to gender, lifecycle and privacy requirements. Sanitation should be culturally acceptable ensured in a non-discriminatory manner and include vulnerable and marginalised groups. This includes addressing public toilet construction issues such as separate female and male toilets to ensure privacy and dignity
Physically accessible	Everyone has the right to water and sanitation services that are physically accessible within, or in the immediate vicinity of, their household, workplace and educational or health institutions. Relatively small adjustments to water and sanitation services can ensure that the needs of the disabled, elderly, women and children are not overlooked, thus improving the dignity, health, and overall quality for all. According to WHO, the water source has to be within 1,000 metres of the home and collection time should not exceed 30 minutes.
Affordable	Water and sanitation facilities and services must be available and affordable for everyone, even the poorest. The costs for water and sanitation services should not exceed 5% of a household's income, meaning services must not affect peoples' capacity to acquire other essential goods and services, including food, housing, health services and education

Sphere (2011) provides indicators for provision of adequate WaSH facilities, appropriate mechanisms for information dissemination, knowledge and understanding amongst the affected population for preventing water- and sanitation-related diseases, and for mobilising communities in the design and maintenance of WaSH facilities (Table 2.3).

Table 2. 3: Sphere Indicators for WaSH (Sphere 2011).

Water Supply Indicators	Excreta Disposal	Hygiene Promotion
<ul style="list-style-type: none"> • Average water use for drinking, cooking and personal hygiene in any household is at least 15 litres per person per day. • The maximum distance from any household to the nearest water point is 500 metres. • Queuing time at a water source is no more than 30 minutes. • There are no faecal coliforms per 100ml of water at the point of delivery and use • Any household-level water treatment options used are effective in improving microbiological water quality and are accompanied by appropriate training, promotion and monitoring 	<ul style="list-style-type: none"> • All excreta containment measures, are at least 30 metres away from any groundwater source. The bottom of any latrine or soak-away pit is at least 1.5 metres above the water table. • In flood or high water table situations, appropriate measures are taken to tackle the problem of faecal contamination of groundwater sources • Drainage or spillage from defecation systems does not contaminate surface water or shallow groundwater sources • A maximum of 20 people use each toilet. • Toilets are no more than 50 mts from dwellings. 	<ul style="list-style-type: none"> • All have access to hygiene items and these are used effectively to maintain health, dignity and well-being • All women and girls of menstruating age are provided with appropriate materials for menstrual hygiene following consultation with the affected population • All have access to information and training on the safe use of hygiene items that are unfamiliar to them • Information on the timing, location, content and target groups for an NFI distribution for the affected population

2.2.2 Emergency WaSH

Diarrhoeal diseases account for more than 40% of deaths in the acute emergency phase; over 80% of deaths occur in children under 2 years of age amongst people living in camps (Connolly et al. 2004). This is due to the synergistic interaction between certain risk factors that promote communicable disease transmission (Connolly et al. 2004). During emergencies, clean drinking water, effective sanitation and good hygiene practices are vital for saving lives and reducing suffering (Clasen and Smith 2005) by effectively controlling conditions such as diarrhoea. Using a systematic review, Connolly et al (2004) identified risk factors that promote communicable diseases in complex emergencies. These include mass population movement and resettlement in temporary locations, overcrowding, economic and environmental degradation, impoverishment, scarcity of safe water, poor sanitation and waste management, absence of shelter, poor nutritional status as a

result of food shortages, and poor access to health care or the collapse or overwhelming of public health infrastructure or absence of health services (Connolly et al. 2004).

This research adapts the framework used for selection of interventions by Fewtrell et al (2005), for analysing the various post-disaster WaSH interventions including water supply, water treatment and safety, sanitation and hygiene (Figure 2.3).

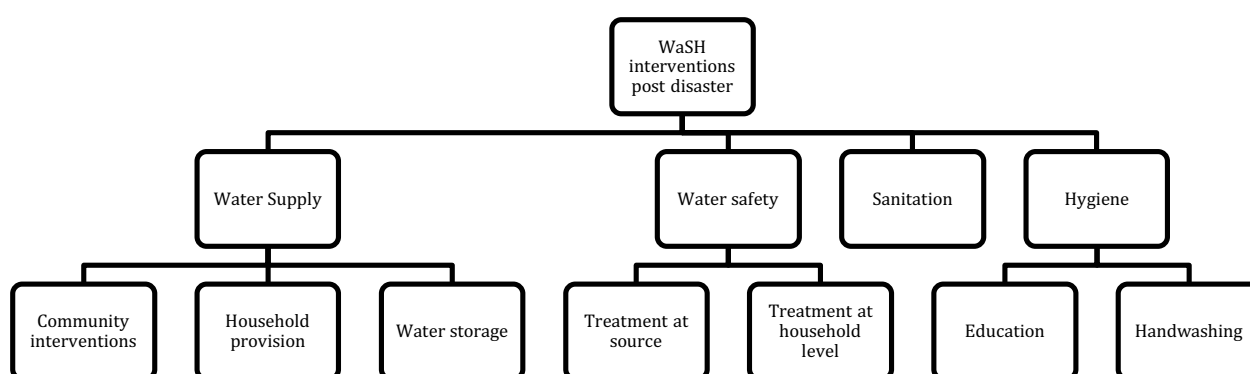


Figure 2. 2 WaSH interventions categories (Adapted from Fewtrell et al., 2005)

The common sources of infection in outbreaks of communicable diseases are: polluted water sources (faecal contaminated surface water entering open or surface water sources); contamination of water during transport or storage due to contact with faecal matter; shared water containers and cooking pots; scarcity of soap for handwashing and consumption of contaminated food (Connolly et al. 2004). The challenges of post-disaster WaSH were recently evident in the experience from the 2010 earthquake in Haiti, where 1.5 million homeless were living in thousands of IDP (Internally displaced population) and makeshift camps set up in Port au Prince without access to adequate sanitation facilities; an epidemic of cholera complicated the relief and recovery efforts the same year affecting 300,000 people and killing 7000 (King et al. 2011). The situation was complex since reportedly the Nepali UN workers had introduced the cholera. The humanitarian agencies were operating trucks of treated water to camps, an expensive undertaking on a vast scale, for more than two years (Bastable and Lamb 2012). These water supply measures did not account for pre-existing networks of water vendors who had substantial capacity to deliver and many who could start up their business with a little extra support (King 2015). The sanitation measures included defecation

in single-use, biodegradable plastic bags (Coloni et al. 2012), or the 'Peepoo' bags marketed as an improvement upon traditional bags used for defecation (Patel et al. 2011).

Emergency WaSH faces numerous challenges in water supply, latrines and solid waste management, hygiene promotion and programming exit strategies (Bastable and Russell 2013). While anecdotes of individual and agency approaches exist, there is an urgent need for field-based research and development into emerging technologies and pragmatic approaches to fill gaps and meet the challenges of adequate and appropriate sanitation systems (Patel et al. 2011). The pre-existing practices, access and equity issues influence WaSH during recovery. The literature reviews water supply, sanitation and hygiene components within WaSH.

Humanitarian water supply entails three essential sub-components: community water supply, household water supply and provision of water storage facilities (John Hopkins and IFRC n.d.). Often communities access rainwater, surface water from lakes, ponds, streams and rivers, which are microbiologically unsafe (ibid). The groundwater from wells, springs tends to be of a higher microbiological quality depending upon the depth of the handpump (John Hopkins and IFRC n.d.). External agencies often provide shared handpumps as it ensures increased visibility, coverage, with minimum assistance or commitment for installation (ibid). There is a risk of contamination in shared facilities due to bad design, and rapid deterioration because of heavy use, disrepair, non-involvement of communities in site selection, and lack of technical assistance and capability for operation and maintenance (McGarry 1980). It is recommended that material selection and design of technology for household maintenance and repair by the local communities is included in the long-term plan to meet population needs for safe drinking water (ibid).

Emergency water source interventions include protection of wells, digging of new boreholes at the communal level, and distribution of water through public tap stands in camp areas. There is no documented evidence of household-level piped distribution initiated during emergency relief phase (Clasen and Smith 2005). Repair of water distribution networks and leakages in the distribution systems are undertaken to resume normal water supply quickly after an emergency (Parkinson, 2009; Smith, 2009). Temporary water supply solutions are expensive and unnecessary unless it is for vulnerable groups with limited or no access to common water sources (Smith 2009).

During emergencies and mass population displacement, water quantity usually takes priority over water quality (Atuyambe et al., 2011). Studies indicate effectiveness of interventions may be influenced by the environmental, behavioural and cultural practices of the affected population (Atuyambe et al., 2011). Studies have found that women, primarily responsible for water collection, were hesitant to use treated water due to taste issues after 2010 landslides displaced 5000 people in Uganda (Atuyambe et al., 2011). Instead, the preference for river and traditional water sources, considered to be unsafe and untreated by the agencies provides valuable insights on recognising traditional beliefs and practices on water governance, and gendered aspects of water collection, defecation and hygiene practices when communities are displaced by disasters.

Participatory approaches for ensuring community ownership and long-term sustainability are essential; and technological solutions need testing and feasibility studies before directly or immediately replicating in different contexts (Brown et al. 2012; Bastable and Russell 2013). It is necessary to document institutional, financial, environmental and social constraints limiting access to water infrastructure services, once international attention is withdrawn in the recovery phase, to inform future programme design (Brown et al., 2012). In post-earthquake Pakistan, Amin and Han (2009) studied rainwater-harvesting (RWH) systems as a supplement to existing water systems and distribution networks enabling low-cost infrastructure investments and efficient management of economic resources during recovery. In rural Muzaffarabad, socio-economic context analysis was the most important factor for sustainability and successful uptake of new water supply facilities, along with due consideration of pre-existing systems, design and material of facilities, ownership of sources, protection and financial costs (Micangeli and Esposito 2010). Participatory approaches in community-led rehabilitation projects helped to reach out to vastly spread communities that did not have access to water (ibid). However such technological interventions depend upon people's attitudes, behaviour and involvement in the programmes (Amin and Han 2009).

From a development perspective, Boydell (1999) argues that rural water supply and sanitation can be sustained through demand-driven approaches, whereby managerial decisions about service, location of facilities, and cost sharing are made locally. Principally, this approach favours community demand over externally determined need, and selecting levels of service to be provided (and by implication, technologies to be employed), based on the communities' desire or willingness to pay instead of an external perception of affordability (Boydell 1999). The application of these principles

in emergencies has been explored – for example cost sharing of WaSH facilities in Haiti (Visser 2012) – but needs further substantiation.

Few studies in emergency WaSH draw attention towards water treatment measures. Brown et al (2012) argue that both sufficient water (quantity) and safety (quality) are critical for interrupting disease transmission in humanitarian settings. There are two methods of water treatment – treatment at source and treatment at point of use. The drinking water response after the 2004 tsunami in Indonesia included mobile treatment plants and installation, repair and rebuilding of emergency storage and distribution systems, distribution of bleach (sodium hypochlorite), bleaching powder (calcium hypochlorite), chlorine tablets (NaDCC, halazone), PUR sachets (combined flocculants and disinfectant products by Proctor and Gamble), and alum (flocculent) (Clasen and Smith 2005). It emerged that household-based approaches in water treatment did not play a significant role in the initial phases of the response, with the possible exception of boiling (Clasen and Smith 2005). After the 2010 floods in Kashmir, bulk water treatment units (BWTU) were deployed to supply adequate and accessible water to large number of users (Luff and Dorea 2012). Although different options for household treatment (referred as PoUWT: Point of Use Water Treatment) exist for small-scale, non-acute, and high diarrhoeal disease-risk emergencies, these require substantial training and materials to recipients, adequate pre-placed stocks in emergency-prone areas, and knowledge of appropriate chlorine dosage (Lantagne and Clasen 2012). Sphere (2011) recommends selecting culturally acceptable PoUWT options and using locally available products for continued use in the longer-term. After the 2003 floods in Haiti, ceramic filter systems were distributed, where the users liked the filters for their health benefits, but were not willing to pay for them or bear replacement costs. Distribution of aquatabs without adequate training, and reported lack of use due to concerns over taste and unwillingness to pay in the long run have been documented (Lantagne and Clasen 2012).

Comparison of BTWUs and PoUWTs shows effectiveness depends on cost of materials, training and follow up: BWTUs need high levels of technical support, high capital costs and certain conditions for optimum use; and PoUWT options require hygiene promotion and user messaging with follow up for effective by households for unfamiliar methods (Luff and Dorea 2012). Even if the water source can be tested and treated for microbiological contamination, water remains at risk of contamination during transportation from point of source to point of use (Luff and Dorea 2012). For successful water use and safety, availability of trained volunteers is essential to undertake cleaning at point of

use immediately after disasters and provide technical assistance in regular monitoring and surveillance (Smith 2009). There is a need for stronger evidence for low-tech solutions for beneficiaries, sustainable treatment solutions at household level, and involving women in using and maintaining water filters; and issues around the cost, sustainability and acceptability of different water filters (Bastable and Russell 2013).

Appropriate sanitation technologies in emergency WaSH are critical. Focusing on sanitation, studies indicate that the benefits of a water quality intervention completely depend upon the sanitation and hygiene conditions: if sanitation conditions are poor, water quality improvements have minimal impact (Eisenberg et al. 2007). Adequate infrastructural provision and sufficient technical capacity and financial resources are required to meet the demand for sanitation, namely for excreta removal, treatment and disposal (WHO/UN-Water 2012). Emergency situations are challenging environments for WaSH implementation, and recent experience from Haiti and elsewhere has highlighted the limitations of current emergency sanitation (Shultz et al. 2009; Brown et al. 2012; King et al. 2013). Bastable and Lamb (2012) present sanitation options for humanitarian workers including squatting slabs, plastic sheeting, and hygiene promotion materials and equipment. The geographical challenges and disasters require appropriate sanitation technologies in challenging environments. This was demonstrated by a study in Indonesia, where communities living on coastal land, swamps and over estuaries and rivers were affected by regular floods, and faced physical limitations to safe sanitation due to lack of land, access roads and availability of water that is not polluted (Djonoputro et al. 2010). This study indicates that the pre-disaster physical environment influences sanitation practices and facilities during disasters, and in recovery.

In Bihar after the Kosi floods, agencies undertook DRR measures in sanitation, to counter the impact of floods on facilities and access during disasters, by constructing latrine complex (consisting of four single-pit pour-flush latrines) along with one handpump on raised platforms (Shekhar et al. 2010). In Bangladesh, and other flood-prone countries, toilets are constructed above the homestead level, to prevent regular floods (Khurshid 2008). For rapid installation during disasters there are financial costs for building raised platforms, which is twice the price of a normal pit latrine, and time-consuming in unstable soils; it is also costly to provide quick linings to prevent pit or trench collapse (Bastable and Lamb 2012). In diverse conditions, the use and maintenance of latrines becomes challenging, affecting the functioning of community management committees – the agencies cannot

pay bills for desludging for long, and poor households cannot bear the operational costs (Bastable and Lamb 2012).

There are some concerns over using development principles in emergency contexts: 'improved' sanitation provision emphasises the value of shared latrines based on functionality rather than techno-centric approach (Sparkman 2012; Mazeau 2013). During cholera outbreaks in camp settings in Kenya, multiple households using the same latrine were found to be breeding grounds for fecal-oral transmission of cholera throughout the community (Shultz et al. 2009). Although the research indicates spread of diseases in camp-settings due to living and sanitary conditions, more research is required for understanding local perceptions and cultural barriers towards shared latrines (Rheinländer et al. 2015). This research builds on the relevance of sanitation and its importance, as perceived by communities that are frequently affected by floods, and are regularly displaced. Despite years of practice and literature, concerns remain regarding humanitarian sanitation choices and sustainability: "Is it sufficient just to dig a hole, put a plastic slab on it, dig in four poles, and wrap some plastic sheeting around it (Bastable and Lamb 2012, p.81)?"

In WaSH, inclusive approaches are used to understand and respect community concerns on gender and sharing toilets between diverse groups including women, children, disabled and the elderly (Pinera et al. 2005). During the 2005 earthquake response in Pakistan, women's needs for privacy and security were addressed by providing separate and screened toilets and bathing blocks as a result of participatory and consultative approaches with the women (Nawaz et al., 2010). After the 2003 Bam earthquake, Oxfam's WaSH response was based on contextual needs and a holistic view, including showers and latrines, cleaning materials and trained human resources in recovery programming (Pinera et al., 2005). The one-size-fits-all approach to sanitation cannot work in all contexts (Jones 2013), especially post-disaster when there is need for speedy, timely and culturally inclusive and appropriate technological solutions (Bastable and Lamb 2012).

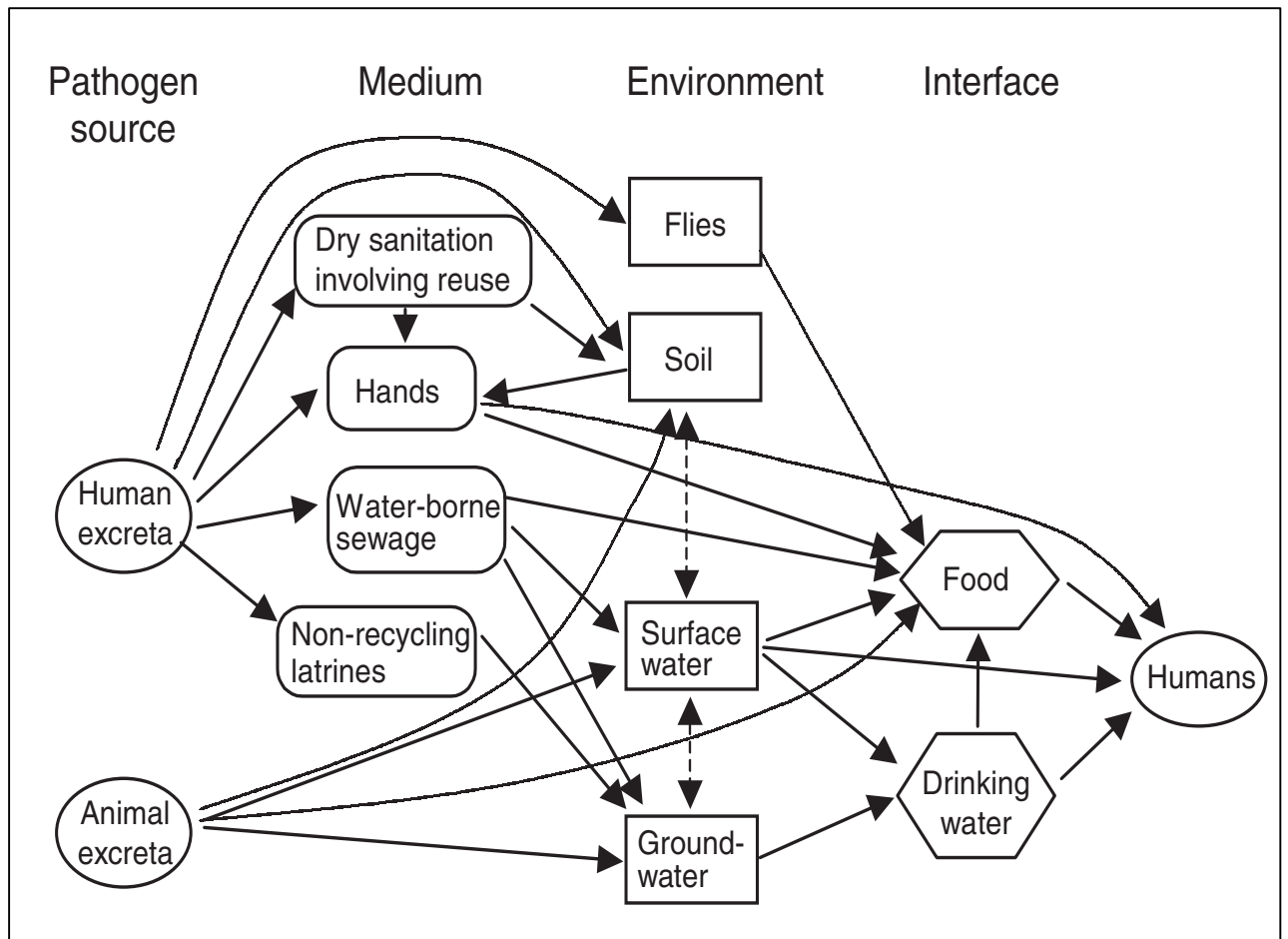


Figure 2. 3: Disease transmission pathways of faeco-oral diseases (Prüss-üstün et al. n.d.)

Hygiene promotion projects during emergencies are effective, along with the other interventions. Meta-analysis and synthesis studies show that hygiene promotion is the most effective way for reducing the incidence of diarrhoea (Parkinson, 2009). Research on the impact of rigorous personal cleanliness and care in eating and drinking habits on reducing risks of water-borne diseases has been carried out in various settings (Feachem et al. 1983; Noji 1992; Goma Epidemiology Group 1994; Mara and Feachem 1999). The provision of appropriate and sufficient water containers, cooking pots, and fuel and soap for handwashing was found to be effective in reducing the risk of cholera (Connolly et al. 2004). Hygiene education or promotion measures are based on the f-chart of Figure 2.3 (Prüss-üstün et al. 2004). The pathogens are transmitted through a complex set of interdependent pathways, including both contaminated food and water along with household- and community- level person-to-person routes (Eisenberg et al. 2007). The hygiene messages address these pathways: water may be contaminated during disasters, exposing individuals through drinking

water or recreational, bathing, or washing activities, and food may be contaminated either through infected animals or from contact with contaminated water or soil. Soil may be contaminated through improper management of excreta (poor sanitation) (Curtis and Cairncross 2003; Prüss-üstün et al. n.d.; Eisenberg et al. 2007).

Curtis and Cairncross (2003) found that risk of diarrhoeal disease associated with not washing hands could be reduced; implying that handwashing could reduce diarrhoea risk by 47%. Hygiene practices are categorised as practices related to personal hygiene, water hygiene, domestic hygiene and environmental hygiene (IFRC, n.d.). Handwashing helps in preventing faeco-oral disease transmission and handwashing stations or personal hygiene kits may increase uptake and consistency of hand washing, but their use in humanitarian response warrants further research (Brown et al., 2012). Sphere (2011) advocated for the Hygiene Improvement Framework (Figure 2.4) that places equal emphasis on the enabling environment, hygiene promotion and access to hardware for reducing diseases in emergencies.

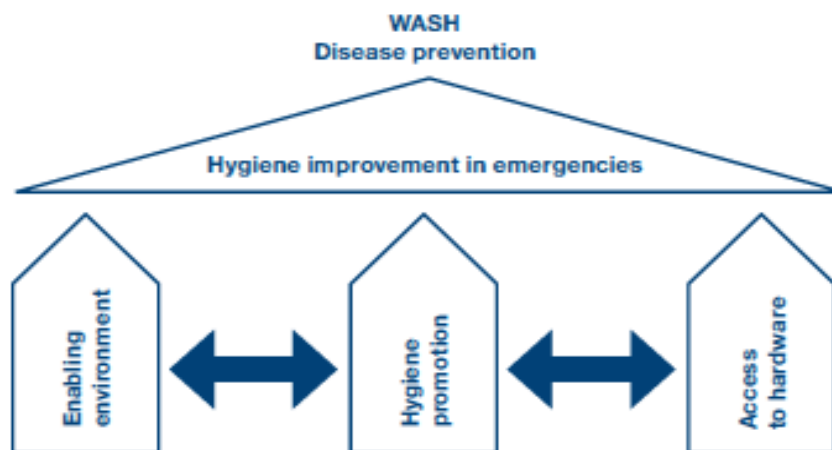


Figure 2. 4: Hygiene improvement framework Source: Sphere (2011)

There is little evidence of what approaches work in effecting behaviour change post-disasters, making it difficult for practitioners to take effective decisions regarding allocation of resources (Brown et al., 2012). There are areas related to school WaSH and menstrual hygiene, which are underexplored within emergency WaSH literature. Bastable and Russell (2013) found that hygiene promotion to children in schools could be part of the intervention strategy. In post-earthquake Haiti, the majority of the schools were found to be lacking in safe drinking water, sanitation and hand washing facilities, and did not invest in instruction for hygiene promotion and health education

(Giardina et al. 2011). Schools act as an institutional vehicle to reach the younger generation and stimulate hygiene and sanitation practices which are sustained beyond the period of an intervention (Giardina et al. 2011). Although guidelines for meeting menstrual hygiene needs exist (e.g. Sphere standards), more work is needed to characterise appropriate strategies to meet needs (Sommer 2012). Menstruation is a taboo subject, yet within same communities there are differences in practices between younger and older women (Nawaz et al. 2010). In Pakistan women were supported with sanitary napkins, and special menstruation units in addition to bathing units through careful involvement and sensitised approach to specific needs of women (Nawaz et al. 2010). However approaches to effect changes during recovery are less documented.

2.2.3 WaSH during recovery

There are challenges for WaSH during recovery in terms of knowledge gaps, and contextual challenges in WaSH and relevant programming approaches during recovery. Emergency WaSH research and practice show improved WaSH strategies adopted during disasters, and call for innovative, on-the-job approaches during implementation. The understanding of what works in emergencies in WaSH interventions remains tacit knowledge, neither systematically documented or published in academic, peer-reviewed journals (Brown et al. 2012). Insufficient evidence exists of what innovations work in the emerging processes, technologies and approaches adopted in humanitarian WaSH service delivery (Brown et al. 2012; Bastable and Russell 2013). The existing knowledge gap can be explored by documenting what technological choices, processes, and approaches are implemented or adopted during recovery and how they allow for transition towards more sustainable solutions.

The tacit knowledge is presented in a handful of technical journals (e.g. Waterlines, Water Alternatives), by WaSH professionals working in international donor agencies (e.g. WHO and UNICEF), or international humanitarian agencies (e.g. Oxfam, ACF, MSF, IRC, Practical Action), international research think-tanks (e.g. ODI, IIED, WEDC, IDS), deployment agencies (e.g. RedR and EWB) and communities of practice (such as SanCoP, Sphere, RWSN, SuSanA and Global WaSH cluster).⁴ Although worldwide technical forums exist, region-specific forums that deal with

⁴ WHO – World Health Organisation, ACF – Action Contra la faim, MSF – Medecins sans Frontiers, IRC – International Rescue Committee, ODI – Overseas Development Institute, IIED – International Institute for Environment and Development, WEDC – Water, Engineering and Development Centre, IDS – Institute of Development Studies, RedR – Registered Engineers for Disaster Relief, EWB – Engineers without Borders, SanCoP – Sanitation Community of Practice, RWSN – Rural Water Supply Network, SuSanA – Sustainable Sanitation Alliance

prevalent context and provide locally sustainable solutions need to be developed. Implementing agencies have refrained from publishing what actually transpired during the programme: the failures in implementation, and failure to learn and document experiences (Jones et al. 2013). Institutions struggle due to weak mechanisms for lesson learning, implementing and sharing, which constitute a brake on innovation and progress. As a result practitioners rely on standardised guidelines, institutional memory and trial and error (Brown et al. 2012).

There are challenges posed by recovery context for successful implementation of WaSH approaches. The practical guidelines for recovery WaSH advocate for integration with the development process (Wisner and Adams 2002). The environmental engineers, policy-makers and programme managers are encouraged to avoid reliance on fixed material resources and instead focus on PHP activities, or community health-worker training to enable communities to make informed choices about source and site selection for water supply and latrines (Wisner and Adams 2002). Humanitarian initiatives to improve water supply or systems should incorporate long term sustainability (Smith 2009). The emergency response measures in WaSH are prescribed from the development sector in which the context and challenges differ from those of emergencies and recovery (Parkinson 2009). Recovery poses different contextual and programming challenges, because the short-term activities are not well integrated into long-term development processes: addressing demographic changes, returning populations, integration of displaced communities with host communities and resettlement to safer locations (Wisner and Adams 2002). Restoration of sanitation services, distribution and access to basic facilities such as toilets and showers allows communities to maintain their standards of hygiene, prevent communicable diseases, improve living conditions and quality of life by repairing and reconstructing existing structures (Pinera et al. 2005).

There is little evidence of what programming approaches and strategies are employed in WaSH during recovery. King's (2015) research in post- earthquake Haiti found that agency WaSH services were short-term and expensive, had weak participation and ownership, leaving services poorly maintained due to weak transition mechanisms and exit strategies. Agencies continued to deploy expensive trucking water, where pre-existing practice of the communities depended on vendors and market for water pouches, moreover agencies who offered support in maintaining kiosks and repairing the water supply network (standpipes and storage reservoirs) lacked the capacity, expertise and guidance for undertaking long-term measures (King 2015). To support adaptive resilience and combat programmatic barriers demand-led, participatory, neighbourhood

rehabilitation approaches are essential (ibid). Interventions should be based on needs assessment in relief and recovery, allowing decision-making to be in the hands of the affected, strengthening ownership, and using local capacity and managing expectations (ibid).

Transitional approaches are essential to link relief to development with a definitive change from a supply-driven to demand-driven approaches such as Participatory Hygiene and Sanitation Transformation (PHAST) approach in camps, training WaSH committees, Community Led Total Sanitation (CLTS) in resettlement or disaster-affected populations (Scott 2013b). Using social indicators such as needs and demand, local participation, capacity building from local to national actors, alliances and partnerships, governance and accountability, livelihood linkages, household finances and agency economic resources a transitional log frame was proposed to achieve sustainable WaSH services (Scott 2013a) .

The systems approach to WaSH and recovery has gained impetus. Parkinson (2009) proposed systems theory to integrate public health, environmental and social processes that affect disease transmission to collate and analyse data obtained from the disparate but relevant fields of study involved. For justified and appropriate resource allocation and decision-making, systems thinking was found to be relevant (Parkinson 2009). To study such interconnections and interdependencies, Neely (2013) proposed the use of complex adaptive systems theory and social network analysis to understand WaSH in communities. Such tools help to bring the perspective of end-users: for example, women can accord importance to factors such as time spent on walking to water points (Neely 2013). Chapter 3 investigates the evidence-base for systems approaches.

The developmental WaSH literature focuses on community participation approaches, integration of appropriate technologies with local knowledge to address open defecation challenge, and interventions towards sustainable access to safe water supply and sanitation facilities. The humanitarian WaSH studies focus on practical challenges faced by agencies to balance the humanitarian needs of the affected communities with longer-term development objectives. Not only do humanitarian agencies have to provide WaSH service delivery that is speedy, timely, appropriate and cost-effective, but they also have to develop strategies for sustainable water supply and sanitation, operation and maintenance of WaSH facilities and hygiene behavioural changes. This research in WaSH attempts to bridge existing gaps in knowledge and practice to understand what strategies work and can aid transition from relief to development.

2.3 Chapter Summary

In this chapter, I have reviewed literature on two research themes related to disaster recovery and WaSH in development and humanitarian contexts. This review has demonstrated the relevance of the research rationale set in Chapter 1. In relation to recovery approaches, there is inadequate empirical evidence on how existing theoretical and practical approaches for building back better, linking relief recovery and development and maximising the window of opportunity after disasters. The literature draws attention to the fact that recovery occurs within the existing socio-economic conditions, cultural and geographical factors, which will be explored using case studies from Eastern India (Chapter 4). The review of the literature relevant to the second research theme for WaSH approaches identified participation, post-disaster access and technological interventions as some of the practical issues in the humanitarian WaSH. During recovery, the issues of inadequate access to WaSH facilities post-disasters, inappropriate WaSH technologies and ineffective post-disaster interventions exacerbate health and environmental risks. The understanding of behavioural changes in WaSH after disasters emerged as a critical knowledge gap, while lack of systematic empirical evidence for transitional approaches in WaSH during recovery emerge as a gap in policy and practice.

Given the challenges in promoting changes during recovery, it will be useful to frame this research within recovery and WaSH domains using resilience objectives. Chapter 3 will establish the value and relevance of using resilience concept as a guiding theoretical framework for this research.

Chapter 3: Conceptual framework

This chapter explores literature on resilience to develop a framework to guide the research design (Chapter 4) and to guide the data gathering and analysis (chapters 5-7).

3.1 The concept of resilience

The recovery literature debates the feasibility of reconstructing the conditions that led to the disaster in the first place (Section 2.1). This research argues that disasters are not just disruption of normal routine (Oliver-Smith, 1998), but are a socially-constructed phenomena (Wisner et al., 2004). Recovery of systems, infrastructure and community should not warrant returning to the previous state of equilibrium but strive for transformation. This section furthers understanding of recovery by reviewing theories and related concepts such as vulnerability, risks, capacities and transformation. The evolution of resilience thinking and these conceptualisations form the core of the resilience framework for this research.

3.1.1 Vulnerability, Risk and Capacity

Early definitions of vulnerability focused on the quantitative degree of potential loss in the event of a natural hazard (UNDHA, 1992). The physical hazards perspective of disasters considered vulnerability as a pre-existing condition based on geographical locations (Cutter 1996). Disasters are not unexpected events but a result of interactions between the physical environment, built environment and the communities that live within these (Mileti 1999; Boshier 2008; Godschalk 2003). Studies focusing on political economy and social construction of disasters focused on the pre-existing conditions in the society that interact with hazards to cause disasters (Cannon, 1994). Disasters are viewed as products of everyday hardships, where those affected are geographically, politically and socially marginalised (Wisner et al., 2004). The socio-political perspectives on disasters view vulnerability as ‘the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard (an extreme natural event or process)’ (Wisner et al., 2004, p11).

Vulnerability conceptualisation has been criticised for imposing categories of *vulnerable groups* that brand and typecast women, children, elderly, and disabled, and economically insecure groups (Furedi, 2007). ‘Vulnerability could be viewed as a reflection of the intrinsic physical, economic,

social and political predisposition or susceptibility of a community to be affected by or suffer adverse effects when impacted by a dangerous physical phenomenon of natural or anthropogenic origin' (Manyena, 2009, p.30). This supply-driven model failed to recognise the capacities within communities, organisations and institutions to withstand the impact of disasters, prepare and plan for disasters, accept certain levels of risk and use the opportunities provided by disasters to improve their conditions (Manyena, 2006). With the rise of the number and severity of disasters, and with the increasing exposure of a significant number of people in hazardous lands, risk perception is an important factor in the social construction of risks and disasters (Cannon, 2008). There have been attempts to define, differentiate, conceptualise and establish the relationships between adaptation, resilience, adaptive action, coping, coping mechanisms and coping strategies (Klein et al., 2003; Cutter et al., 2008). Adaptation efforts aim to reduce the impact of environmental hazards and to address equity concerns inherent in sustainability discourses (Cutter et al., 2008).

Some authors have distinguished coping capacity as the ability of a unit to respond to an occurrence of harm and to avoid its potential impacts, and adaptive capacity as the ability of a unit to gradually transform its structure, functioning or organisation to survive under hazards (Kelly and Adger 2000). The critique of vulnerability concepts focuses attention to intrinsic capacities of communities, based on understanding of coping and adaptation (Pelling 2011). This research understands capacity as '...the resources and assets that people possess to resist, cope with and recover from disaster shocks they experience' (Wisner et al., 2012, p28). In this research, coping capacity is interpreted as surviving within the prevailing systems (Pelling 2011). Building on the social, physical and organisational elements of a system this research explores social construction of disasters and their impact on essential services (Wisner et al., 2004). Resilience is intrinsically linked to, and undermined by vulnerability (Manyena 2006).

3.1.2 Community resilience to disasters

'Building Resilience' has been invoked as a new organising principle by various international organisations, UN bodies and government agencies to assess, monitor and report on the progress and outcomes of various interventions worldwide (Levine et al. 2012, p.1). The increasing number and impact of disasters have encouraged a growth in research on resilience, and on enabling communities to recover with minimal external assistance (Mileti 1999). A resilience approach is

more positive than a vulnerability approach, because it focuses on improving and augmenting capacities, rather than focusing on problems, how to reduce or cope with them (Manyena, 2006).

The word resilience originates from the Latin word '*resiliere*' which means to 'leap back' (Holling, 1973) or 'jump back' (Klein et al., 2003). The Oxford English Dictionary defines resilience as (i) the act of rebounding or springing back and (ii) elasticity (Klein et al., 2003). Conceptually, resilience has multiple interpretations based on different disciplinary perspectives. Holling (1973) is attributed to have first used the term '*resilience*' from an ecological perspective (Manyena, 2006; Cutter et al., 2008) as the measure of the ability of an ecosystem to absorb changes and still persist and return to its state of equilibrium after a temporary disturbance (Holling, 1973). In disaster studies, Klein et al. (2003) note that Timmerman in 1981 first adopted the term as a measure of a system's capacity to absorb and recover from hazards (Klein et al., 2003; Mayunga, 2007).

Resilience is variously studied in ecology (Gunderson and Holling, 2001; Carpenter et al., 2001); psychology (Paton et al., 2005; Truffino, 2010); ecosystem renewal (Holling, 1973); risk management (Mitchell and Harris, 2012); hazard mitigation (Mileti, 1999; Tobin, 1999; Burby et al., 2000); pathways to sustainable development (Vogel et al. 2007); built environment and land use studies (Burby et al., 2000; Boshier, 2008); public infrastructure (McDaniels et al., 2008); coastal studies (Adger et al., 2005; George, n.d.; Oliver-Smith, 2009), and urban studies (Stevens et al., 2010). Authors have found resilience to be a useful concept for holistic and sustainable disaster recovery (Berke, 2006), linking disaster risk reduction with development (Manyena, 2006; Twigg, 2007) and climate change adaptation (Adger et al., 2003; Schipper and Pelling, 2006; Cutter et al., 2008; Pelling, 2011).

It is highly probable that the term '*resilience*' emerged in reaction to the concept of a '*disaster resistant community*' (McEntire et al. 2002, p.269). The latter was coined by Geis (2000) as '*the safest possible community that we have the knowledge to design and build in a natural hazard context*' (p.152). It is a means to assist communities in minimising their vulnerability to natural hazards by applying the principles and techniques of mitigation to their development and/or redevelopment decision-making process through earthquake-resistant buildings (Geis 2000). Resilience focused on the interconnections and relationships between physical and social systems at various scales (Tobin, 1999; Godschalk, 2003). Resilience is an active process of self-righting,

learned resourcefulness and growth; the ability to function psychologically at a level far greater than expected, given the individual's capabilities and previous experience (Paton et al., 2005, p.173). Since an individual or group or community possesses resilience of varying degree over differing periods, it is difficult to describe or gain conceptual consensus about resilience (McEntire et al., 2002).

There are different conceptualisations of resilience. Resilience approach has added value in mobilising faster actions for rapid and successful delivery (Schwab et al. 1998). Twigg (2007) argues that reducing pre-existing vulnerabilities, building capacities and increasing disaster risk reduction (DRR) measures are steps towards increasing resilience. Some conceptualise resilience as an outcome ('bounce back', 'withstand', and 'absorb negative impacts') or as a process that incorporates adaptive capacity, change and learning (Manyena, 2006). Different studies explore the linkage between recovery, vulnerability, resilience and adaptive capacities (Comfort et al. 1999; Manyena 2006; Cutter et al. 2008; King et al. 2013). Norris et al (2008) find community resilience is a process linking a network of adaptive capacities (resources with dynamic attributes) to adaptation after a disturbance or adversity, when used as a metaphor, theory or set of capacities (Norris et al. 2008). Gaillard (2007) describes three perspectives of resilience: as a component of vulnerability, as the flip side or positive side of vulnerability, and as the capacity of a system to absorb and recover from a hazardous event.

There are numerous existing conceptual models for resilience. Twigg (2007) considers characteristics of resilient communities as governance, risk assessment, knowledge and education, risk management and vulnerability reduction, and disaster preparedness and response. Manyena (2009) analyses resilience within the themes of integrating disasters and development, community participation, social learning and livelihood security. From an adaptive governance perspective, Djalante et al (2011) investigate four characteristics to increase resilience to natural hazards, namely polycentric and multi-layered institutions, participation and collaboration, self-organisation and networks, and learning and innovation. In the DROP (Disaster Resilience of Place) model proposed by Cutter (2008), resilience is both an inherent or antecedent condition and a process. The antecedent conditions are viewed as a snapshot in time or as a static state and the post-event processes in the model are dynamic (Cutter 2008). The Panarchy framework looks at the links between human and natural systems in temporal and spatial dimensions using a hierarchical

structure, linking the systems in non-stop adaptive cycles of growth, accumulation, restructuring, and renewal in a coupled human-environmental system (Gunderson and Holling 2001).

Paton and Johnston (2001) base their conceptual model on risk perception and risk reducing behaviour through action-outcome expectancies (i.e. consideration of whether risk may be reduced) and self-efficacy judgments (i.e. whether the required actions are within the capabilities of the individual). This model argues that people make assumptions about the possible consequences of action before considering engaging in that behaviour; hence action-outcome expectancies precede efficacy judgments (Paton and Johnston 2001). Tobin (1999) proposed a model suitable for a post-disaster recovery environment, based on structural-functional views, conflict theory, competition for resources, and other geo-sociological and anthropological principles for understanding community resilience. This model highlights internal (i.e. structural, situational and cognitive factors) and external influences (i.e. mitigation and recovery) on overall structural-functional characteristics of resilience (Tobin 1999). Bahadur et al. (2010) lists resilience characteristics as high diversity, effective governance/institutions/control mechanisms, acceptance of uncertainty and change, community involvement and inclusion of local knowledge, preparedness, planning and readiness, high degree of equity, social values and structures, non-equilibrium system dynamics, learning, and adoption of a cross-scalar perspective.

For this research the applicability of resilience as a concept in the post-disaster recovery environment was explored (Manyena, 2006; Cutter et al., 2008; Bahadur et al., 2010). The key questions for reviewing resilience literature were:

1. How has the author conceptualised resilience? Whose resilience and against what? For what purposes and how it can be achieved?
2. What elements of the definition of resilience can be easily translated for operational and practical action in disaster response and recovery programmes?

The above questions are not new, and have often been discussed in the literature (Carpenter et al. 2001; Mitchell and Harris 2012; Pelling 2011). Addressing these two questions helps in uncovering certain aspects of the research question, to understand community response and approaches for resilience. The figure 3.1 summarises the key elements of the resilience conceptualisations from existing literature.

Whose resilience?	What is resilience?	Resilience from what?	How systems become disaster-resilient?
<ul style="list-style-type: none"> •Systems •Communities •Societies •Individual •Groups •Organizations •Ecosystems •Any actor 	<ul style="list-style-type: none"> •Capacity/ability to: <ul style="list-style-type: none"> •Absorb stress •Respond •Recover or bounce back •Absorb impacts •Cope with event •Reduce losses and damages •Adapt existing resources and skills to new systems and operating conditions. •Withstand and rebuild •Action: <ul style="list-style-type: none"> •Anticipate and plan for future •Manage basic functions and structures 	<ul style="list-style-type: none"> •Stress or shocks •Destructive forces •Disasters •Potential exposure to hazards •Unanticipated dangers •Extreme natural event •Externally or internally induced set of extraordinary demands •Environmental shocks 	<ul style="list-style-type: none"> •Capacity building of communities and local organisations •Self-organisation/reorganisation of systems, local actors •Learning •Innovate, and develop •No change in fundamental characteristics •Maintain sustainability of livelihoods •Social Capital

Figure 3. 1: Aspects of resilience conceptualisation (Author's interpretation)

Firstly, resilience is defined for systems and communities (Aguirre 2006; Twigg 2007; Cutter et al. 2008; UNISDR 2009); societies and individuals (Paton et al. 2005); groups, organisations and actors (Pelling 2011); and ecosystems (Holling 1973). Resilience is seen as a capacity or capability (Manyena 2006) to act in response to any form of disturbance or perturbations (Holling 1973; Carpenter et al. 2001); stress or environmental shocks (Manyena 2006); destructive forces or disasters (Twigg 2007; Cutter et al. 2008; UNISDR 2009); potential exposure to hazards (UNISDR 2009); unanticipated dangers, extreme natural events (Mileti 1999); and externally or internally induced demands (Aguirre 2006). Various propositions on achieving resilience are put forth depending on characteristics of the unit or actor, including inherent capacities, learning, organising, innovating and changing. From an ecological perspective emphasis is on resistance and maintaining basic characteristics while another perspective calls for a transformational change or evolution into a better performing unit which can deal with future risks and disasters (Bahadur et al. 2010). Within the dynamic systems some put it as bounce forward ability with more optimism signalling forward change (Manyena, et al., 2011; IPCC, 2012; Mitchell and Harris, 2012).

The traditional view of resilience as 'bounce back' has been critiqued as it did not lead towards transformational gains (Dodman et al. 2013). The formulation of resilience as the 'bounce-forward' ability of communities from disasters is closely related to the idea of transformational nature of disasters (Manyena, et al., 2011, Pelling 2011). From the ecological perspective, resilience is seen as the capacity to withstand change for some time but also, past a certain point, to transform while continuing or regaining the ability to provide essential functions, services, amenities, or qualities (Walker and Salt 2006; Moser 2008). Manyena et al (2011) elaborate that '...the "bounce forward" notion encapsulates social engineering, if not community agency, in change processes within the context of new realities brought about by a disaster.' (p.419). The distinction between resilience and transformation post-disaster, and how both can be achieved is unclear; there has been little discussion and debate about these linkages. Pelling (2011) states that resilience is seeking change '... that can allow existing functions and practices to persist and in this way not questioning the underlying assumptions or power asymmetries in society.' (p.50). Transformation is 'indicated by reform in overarching political-economy regimes and associated cultural discourses' (ibid).

'Transformation is conceptually nascent but drawing on insights from it provides potentially valuable opportunities for those designing resilience initiatives' (Bahadur 2014, p.73). Resilience and transformation are differentiated by the scope and range of changes to values, institutions, behaviour and assets achieved (Pelling 2011). Resilience thinking is useful for thinking about long-term transformation; it is not just bouncing back after disturbance but also about transformation and the usefulness of transformation (Leach 2008). Transformation provides an effective set of principles with which to rectify the charge of 'incrementality' levelled at resilience thinking (Bahadur 2014, p.74). Pelling (2011) proposes transformation as one of the three pathways, along with resilience (maintaining status quo), and transition (incremental change). Transformation refers to irreversible regime changes, based on the recognition that paradigms and structural constraints impede widespread and deep social reform (Pelling 2011). Since transformation is fundamentally linked to issues of power and politics, it helps in reframing resilience thinking, and contests the failure of resilience to include values and political context of decision-making (Leach 2008).

Secondly, this research framework adopts aspects of existing resilience frameworks and models, whereby the recurring themes are included in the conceptual framework (Section 3.3). Resilience highlights the role of agency or actor who is affected, impacted, or influenced by post-disaster

changes, it includes the set of actions to be taken to mitigate, absorb the impacts and to anticipate and prepare for future disasters. There is a need for effective institutions and institutional structures for resilience (Mayunga 2007; Djalante et al. 2011). Trust, norms and networks in a system are important; perhaps manifested through a large number of credible civil society institutions such as religious organisations and recreational clubs that are an integral form of social capital (Mayunga 2007 p.7). Closely associated with this notion of effective institutions is the idea of self-organisation or reorganisation that emerges as a key recurring theme in resilience thinking (Carpenter et al. 2001; Ostrom and Cox 2010). The ability to self-organise is related to the extent to which reorganisation is endogenous rather than forced by external drivers (Holling 1973; Carpenter et al. 2001; Gunderson and Holling 2001;). Self-organisation is enhanced by coevolved ecosystem components and the presence of social networks that facilitate innovative problem solving through a learning approach (Carpenter et al. 2001).

This close relation of learning approaches with self-organisation, is of interest, as reiterated by the UNISDR's (2005) definition that resilience is determined by the degree to which the social system is capable of organising itself to increase the capacity for learning from disasters for better future protection and to improve risk reduction measures. This defines the scope for learning and innovation (Pahl-Wostl 2007; Pelling and High 2005; Voss and Wagner 2010; Djalante et al. 2011). Foster (2006) describes two types of resilience: preparation resilience including regional assessment and readiness, and performance resilience comprising event response and recovery. These stages are continual and overlap in terms of regions and scale and starting point (Foster 2006). The resilience studies are common in their understanding of diversity, redundancy and high levels of integration required between natural and social systems and therefore consider resilience approaches to study social, ecological and socio-ecological systems (Bahadur et al., 2010).

Researchers, analysts, managers and theorists have reviewed, analysed, rephrased resilience discussions and debated the usefulness and challenges of using the concept (Godschalk, 2003; Cutter et al., 2008; McDaniels et al., 2008; Bahadur et al., 2010). The conceptual and practical challenges define the nature of resilience and its implementation (Manyena, 2006). Resilience definitions are ambiguous and incoherent across disciplines, increasingly difficult to gain consensus for defining, measuring, assessing and/or mapping resilience (Mayunga 2007). Resilience thinking is multi-disciplinary, limited to theoretical understanding, and lacks empirical evidence (Bahadur et al.

2010). Cannon and Muller-Mahn (2010) argue that resilience thinking derived from an ecosystems approach focuses on nature and natural systems rather than socio-economic systems; therefore the human action is “blamed” for the problems. An unclear resilience approach is in danger of a realignment towards interventions that subsume and neutralise politics and economics, and depoliticises the causal processes inherent in putting people at risk (Cannon and Müller-Mahn 2010).

Bahadur et al (2010) conclude that there is little guidance for developing indicators for specific situations and for data collection. The challenge with the existing frameworks and models of resilience is operationalization during recovery. Agency guidelines and standards for humanitarian response may not explicitly adopt or adhere to resilience thinking. A recent blog post by Whittall et al (2014) generated debates from humanitarian professionals engaged in WaSH on how resilience could add value in post-disaster context. The concept of building resilience is often at odds with a core humanitarian approach to crises due to the challenges of dealing with the state that requires time vs. addressing immediate needs of vulnerable groups (Whittall et al. 2014).

Levine et al (2012) state that

‘though recovery is normally assumed, there is a dearth of evidence on just how this happens. The preference for simplicity also means that frameworks cannot assist in answering critical questions, such as what is it that makes people more or less sensitive to crisis, because these dimensions are left as unexplained “black boxes”’ (p.2).

The desire to quantify resilience is obvious: to assess comparative need, target resources, measure impact and judge ‘value for money’ (Levine et al. 2012, p.4). The trade-off between short-term and long-term recovery recurs in resilience literature, where immediate decisions are made to avert imminent threats. Resilience thinking stemming from diverse epistemic foundations makes particular judgements based on values attached to either social, technological or ecological systems (Bahadur 2014). Similarly trade-offs are made on the functionalistic perspective, in ensuring that the system maintains its basic functioning in the face of disaster (Twigg 2007; UNISDR 2009), without addressing the structures in place that make them vulnerable to disasters in the first place. There is limited evidence of how resilience addresses power issues at various scales – individual, or

household or community – and how these are reflected in policies and practice without acknowledging the political complexities (Cannon and Müller-Mahn 2010; Griffin 2012).

As a system attribute, resilience does not clearly distinguish system as an entity, its boundaries and relation with its environment (Mayunga, 2007; Bahadur et al., 2010). Resilience may just reinforce the focus on hazard or shock, at the expense of vulnerability (Mitchell and Harris, 2012). It diverts attention away from the role of agency, power and politics; disbanding, destroying or modifying a given system or some parts so that presence of certain other parts, or systems is more desirable and resilient (Mitchell and Harris, 2012). Hence to answer ‘resilience for what, against whom?’ resilience is both the capacity of a system to react appropriately to moments of crises that have not been entirely anticipated, and its ability to anticipate these crises and to enact, through planning and recovery, changes in the systems that will mitigate disaster impacts (Aguirre, 2006). Residual uncertainty is inevitable in adapting to changing circumstances (Pelling and High, 2005), therefore "cultures of safety" can be developed that provide patterns of anticipated effects, actions, and strategies as well as templates for response, recovery, and mitigation (Aguirre 2006, p.2). It is obvious that any opportunity to increase people’s ability should be seized (Levine et al., 2012). Despite concerns of blindly adopting resilience as a concept (McEntire et al. 2002; Furedi 2007; Mitchell and Harris 2012, Levine et al., 2012), this research adopts resilience as an approach that provides an opportunity to ‘work across silos’ (Levine et al. 2012, p.1) and to break down the barriers between disciplinary ghettos.

3.2 Systems thinking and resilience

‘Resilience thinking is systems thinking,’ (Walker and Salt 2006 p.31). There are many parallels in resilience and systems thinking. Systems theory has a far-reaching influence with its promise of providing a mechanism to integrate the social and natural (Pelling 2011). It provides theoretical precision on social learning and self-organisation. Pelling (2011) argues that using systems approach in resilience draws attention to the power debates and asymmetries, which determine for whom, where and when the disaster impacts are felt, and the scope for recovery. Systems thinking incorporates changes in socio-political systems driven from actions of people at risk, building on existing social and political reform movements (Pelling 2011). Foster (2006) found that systems thinking applies to the system as a whole, and its elements, such as infrastructure, information,

physical environment, civic organisations, governance and economic systems. A system that is resilient on one element may not necessarily be resilient on another (Foster 2006). An urban study by da Silva et al (2012) explored complex 'living' systems undergoing numerous dynamic exchanges at any given time, and found that changes are systemic (i.e. changes in one element of the system may induce changes in another element), and dynamic (the result of feedback loops) (da Silva et al. 2012).

Chapter 2 demonstrated recovery is riddled with complexities. Ramalingam et al (2008) propose systems theory concepts to deal with these complexities with the help of 10 guiding concepts: interconnectedness and interdependent elements and dimensions; feedback processes that promote and inhibit change within systems; system characteristics and behaviours emerge from simple rules of interaction; nonlinearity; sensitivity to initial conditions; phase space – 'the space of the possible'; attractors, chaos and the 'edge of chaos'; adaptive agents; self-organisation; co-evolution (Ramalingam et al. 2008). Systems thinking is used variously as an analytical tool or to organise existing knowledge about resilience capacities, outcomes and actions (Wright et al. 2012). It studies issues and interactions with other parts within the system, with an expanded view of the situation, and analyses the units within (Foster 2006). In recovery it is used for informed decision-making, better understanding of the system, the interrelated nature of elements in the system and identifying patterns of behaviour (Simonović 2011). In emergency WaSH, a systems theory framework is useful to integrate and analyse data obtained from public health, environmental health and social determinants affecting disease transmission (Parkinson 2009). Complex Adaptive Systems theory is used to investigate the unpredictability of outcomes for community water supply projects in East Timor (Neely 2013).

This research identifies systems thinking as a foundation to organise actors at various scales and study their interconnections, useful to study WaSH facilities, governance mechanisms, community practices and agency interventions during recovery. Building on Simonović's (2011) approach, systems thinking studies dynamics during recovery, particularly in hygiene behaviour and WaSH practices, understanding the structures and elements of the system, the interactions between actors across different scales through feedback and learning mechanisms. This approach will add value to existing knowledge and provide a foundation to develop a framework for exploring and gathering empirical evidence and practitioner feedback. This research incorporates systems thinking

into the framework by involving different stakeholders – individuals, households and communities, local and external actors and their interdependencies over time, scale and sectors or components. The framework addresses the multiple interpretations by different actors in a system by including a scalar perspective to seek understanding of how people, groups and organisations frame their resilience (Leach 2008). Such a framework reflects multiple recovery priorities, aspirations and capacities.

3.3 Conceptual framework for WaSH during recovery

This research understands community resilience as the capacity of local communities and related systems and institutions to absorb stress during disasters and recover from them, with the ability to perform their essential functions and develop their inherent capacities to prepare for future disasters and recover from such disasters with least external assistance. This conceptualisation of community resilience views community as an active agent, and studies their interactions with WaSH systems. Based on the review of resilience, recovery and WaSH literature, learning and knowledge, participation, integration and institutions are adopted as conceptual themes to study resilience in WaSH during recovery (Manyena 2006; Twigg 2007; Bahadur et al. 2010; Voss and Wagner 2010; Lyons et al. 2010; Whatley 2013). The thematic components include sub-themes and specific WaSH indicators. The framework is validated through expert interviews and feedback from 12 humanitarian and development WaSH professionals including public health engineers and promoters, DRR practitioners and academics using an interview guide (annexure 4). The final framework incorporated their feedback on the relevance of the sub-themes, the potential indicators and their description, the potential tools for gathering empirical evidence related to that indicator and potential sources of evidence (annexure 5). Practitioners' inputs on the framework and its feasibility proved instrumental in choosing indicators for WaSH and appropriate tools to gather empirical evidence. The overall feedback was that the framework components were relevant and useful, but did not factor or represent time, scale and processes.

Figure 3.2 shows the framework for WaSH during recovery and its four key themes; the themes are discussed in sections 3.4-3.7.

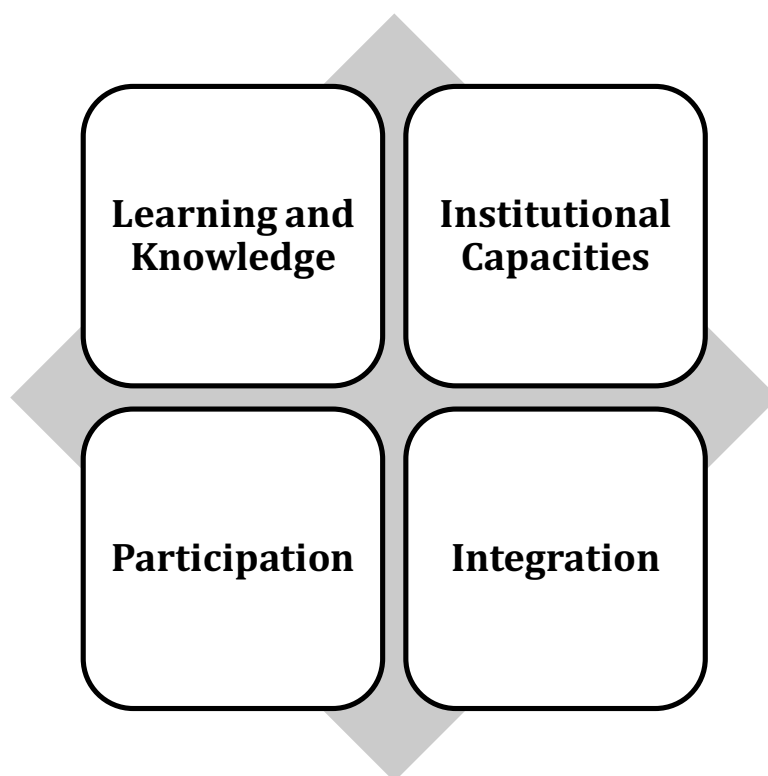


Figure 3. 2: Community Resilience: Conceptual framework for WaSH during recovery

3.4 Learning and knowledge

Manyena et al. (2011) argue that new approaches for learning at the community and organisation levels are required for resilience. This research explores themes of learning and knowledge to understand resilience. The framework includes social learning under the theme of learning, and technological interventions complementing local knowledge under knowledge. The indicators refer to aspects of organisational learning within learning theme. Social learning in WaSH during recovery is explored through hygiene behaviour changes and socio-cultural practices.

From a development perspective, Guijt (2007) proposed learning for social change based on people, power and processes for transformation and redistribution of power. Assessment and learning are processes of on-going reflection about vision, strategies and actions that enable continual readjustment (Guijt 2007). Manyena (2009) found that humanitarian and development programmes included institutional and community learning for promoting resilience to future disasters. Cutter et al (2008) distinguish between programmes employing “lessons learned” at the end of a programme and learning for resilience. The former includes programme debriefings, or

lessons identified on what went right or wrong and suggestions for course-corrections, while learning for resilience emphasises critical reflections on these lessons based on organisational values and practice (Cutter et al. 2008).

Learning theories refer to three loops of learning: first, second and third loop learning (Boyd et al. 2014). First loop is improving what is already being done, second loop means learning to change the mechanisms used to meet the objectives, and third loop involves changing underlying values that determine goals and actions (Argyris and Schön 1996). Voss and Wagner (2010) furthered the theory: in single-loop-learning, goal divergence and adaptation errors are recognised and corrected. Double-loop-learning goes beyond simple error correction, to develop learning for improvement that questions underlying causes and triggers additional learning (Voss and Wagner 2010). Voss and Wagner (2010) call the third-loop 'deutero learning' – the skill in handling and influencing single- and double-loop-learning – or 'learning to understand', which focuses on factors promoting or inhibiting learning and securing capacities for self-organisation.

It is argued that:

'Knowledge of past failures in practice and learning is gathered, its communication encouraged and consequently a process of (self-) reflection of the adequacy of organisational knowledge, structures and rules of behaviour is institutionalised. By this means the response capacity of the organisation or the network of organisations is enhanced with regards to unpredictable societal and environmental change (Voss and Wagner 2010 p.663)'.

An alternative approach, including different experts, risk-bearers and local communities, involves knowledge and practice being contested, co-produced and reflected upon (Vogel et al. 2007). Co-production of knowledge for decision-making and policy context involving various stakeholders – experts, bureaucrats and primary stakeholders – produces new insights, information and expert knowledge by contesting and negotiating with the local indigenous knowledge, in the creation of new knowledge (Edelenbos et al. 2011). Vogel et al (2007) find that the practical implementation of such learning approaches and tools for gaining consensus by various stakeholders remains a knowledge gap. A combination of scientific/technical and traditional knowledge bases is necessary for building resilience (Berkes 2007). Within organisations, learning is a critical component for effectiveness, where a strong learning organisation is created through the dynamics of strong and

committed learners, a favourable learning culture or ethos, and effective learning mechanisms or structures (Whatley 2013). The memories of experiences, skills, values, and decision-making processes stored within institutions are called institutional memory or a knowledge system (Djalante et al. 2011). In the event of small-scale disasters, it is argued that learning lessons from small disasters (for example, a flash flood in a small town) is extremely important for institutions to help reduce possible damage during future disasters (Voss and Wagner 2010). There is a lack of evidence about the technologies, approaches and processes used in WaSH programmes (Brown et al. 2012).

Pelling (2011) finds social learning to be a property of social collectives, their capacities and processes through which new values, ideas and practices are disseminated, popularised and become dominant in society or local communities. Within literature, ideas of social learning have been advanced in the context of adaptive governance as a collective activity, which entails the cooperative production of knowledge concerning systemic aspects of society – the prevailing social and political conditions (Boyd et al. 2014). Social learning is often facilitated through accumulation of social-ecological learning and understanding, often referred to as social memory (Folke 2006; Djalante et al. 2011). Within disaster studies, learning is investigated through changes in behaviour: for instance cyclone evacuation studies in Bangladesh found that people's perceptions, previous experiences of hazards, and attitudes acted as the principal deterrents of evacuation (Paul et al. 2010). Another study found that past hazard experience influenced evacuation behaviour depending upon the severity of previous impact experience, false alarms, and past evacuation experience including the quality of the stay in a relief shelter (Sharma and Patt 2012). This thesis attempts to develop an understanding of how social learning occurs and manifests in the form of behaviour changes in WaSH practices through external support.

Studies show that past experiences and attitudes influence behavioural changes in disasters, but little guidance is available on how these changes are effected during recovery. Djalante et al (2011) claim that social learning is essentially accumulated experiences, values, debates, and decision-making processes that have been used as strategies to continually deal with change. In disaster studies, it has been suggested that the experience of recovery should be situated within the role of place as a reorienting framework, including aspects of social capital, social and collective identities and networks to reframe the discourse on recovery interventions based on experiences (Cox and

Perry 2011). In WaSH, a cross-countries study of hand-washing practices divided the factors that determine health-related behaviour into planned, motivated and habitual categories for conceptual understanding and research (Curtis et al. 2009). They claimed that environment (social, physical and biological) and cognitive aspects (motivation, habits and planning) influenced handwashing behaviour (ibid). Curtis et al (2009) found that motivation was often triggered by disgust, nurture, status, affiliation, attraction, comfort and fear. The investigation of post-disaster changes will show how learning occurs.

In knowledge aspects, this research investigates technological interventions to find how these complement local knowledge. Use of appropriate technologies can be enhanced by understanding how decisions on WaSH technologies are taken, who takes them and implements them. Social learning transforms the potential behaviour of an actor – an individual, a formal organisation, an informal group or even a non-human actant such as elements of technology or nature – capable of changing behaviour in response to experience (Pelling and High 2005 p.6). The application of technology enables technological evolution, new information exchange, informed decision-making and documentation of best practices, effective outcomes of approaches for upscale by government action or replication (Pelling, 2011, p. 56). Studies on water management systems explore continual learning and improvement of interconnected technical systems and human systems, where technologies are embedded in a network of social routines that link technologies to their function (Pahl-Wostl 2007).

Disaster studies consider local knowledge including community perceptions, beliefs, understandings, and skills used or potentially used to communicate about the physical and built environment (Wisner, 2009). Any external assistance should build upon the knowledge, capacities and expertise within the community to reduce dependency and ensure sustainable changes (Pelling and High, 2005). Emerging from the Gujarat reconstruction experience, it was argued that the introduction of technology is a process, including appropriate design, and creation and institutionalisation of delivery mechanisms, information, communication of technology and capacity building of existing indigenous knowledge and practices (Jigyasu 2010). This research explores the available technological options in WaSH, their technical feasibility in challenging environments and community or household adoption of such technologies (Djonoputro et al. 2010; Brown et al. 2012; Bastable and Lamb 2012).

3.5 Institutional capacities

This research proposes study of institutional capacities and mechanisms for undertaking WaSH during recovery. The relevant institutions include national, sub-national and local government organisations (GOs), informal community groups, grassroots organisations (GROs) or community based organisations (CBOs), Civil Society Organisations (CSOs) and non-governmental organisations (NGOs). In order to clarify the use of terms, institutions are understood to be organisations that are held together by and produce rules, norms and arrangements ('rules of the game'), and agencies or organisations are referred as actors ('players of the game') (Jones 2013 p. 68).

Carpenter et al. (2001) underline the importance of institutions that can facilitate learning and 'experiment in safe ways, monitor results, update assessments, and modify policy as new knowledge is gained.' (p.778) Experimentation is also seen as key to maintaining the stability of a system (Bulkeley and Castán Broto 2013). Self-organisation is a recurring aspect of resilience, and Pelling (2001) conceptualises it as propensity for social collectives to form without direction from the state or high-level actors. This could include new canonical (formal) organisations such as registered community development groups or trade associations, or shadow (informal) organisations such as networks of friends and neighbours (Pelling 2011 p.61). Training and technical expertise to strengthen the community capacities can be sustained through such institutions and institution-building (Manyena, 2009). A doctoral study of WaSH development actors and networks in Mali by Jones (2013) brings to light that approaches to understanding local institutions, emphasising the importance of improvisation and adaptation across different scales, should be placed within broader political economy analysis. Different approaches at community and at local government and national levels are required: for the communities to draw upon traditional WaSH practices and agency influences to effect behavioural and technical changes, and at the regional level to adopt 'best practice' rather than 'best fit', and providing additional resources to build abilities of local governments to deliver sustainable WaSH services (Jones 2013). Although Jones's (2013) thesis focused on development WaSH, the importance of governance mechanisms in WaSH service delivery are crucial in a post-disaster context for sustainable and changes and accessible WaSH facilities. This research investigates institutional pathways through representative institutional mechanisms and policies; organisational mandate and capacities, facilities and infrastructure studied through resource allocation and use of information and data.

3.6 Participation

This research proposes community participation, multi-stakeholder partnerships and participatory monitoring and evaluation as indicators to explore WaSH recovery programming. WaSH services and facilities are characterised by a large range of stakeholders and a poor understanding of the responsibilities of each actor (Mazeau 2013). This lack of understanding can be challenging during recovery. Sanitation development approaches (such as Community-Led Total Sanitation (CLTS) and its variants, and Sanitation Marketing) emphasise changing the attitudes of those practising open defecation or using sub-standard facilities, persuading them to improve sanitation practices and encouraging households to invest in sanitation improvement (Carter 2015). Mara (2012) sees the poor state of sanitation as the result of a lack of political will and a lack of expertise among engineers in transferring existing technologies (Mara 2012). The success of organisations depends on their ability to design themselves as social learning systems and also to participate in broader learning systems such as an industry, a region, or a consortium, as participation in communities of practice facilitates learning (Wenger 2000). Pelling (2011) notes, 'There is the potential for bottom-up, aggregate transformational change through, for example, the promotion of stakeholder participation in decision-making, leading to the inclusion of new perspectives and values in emerging policy' (p. 69). For transformation, it is essential that local communities actively participate in decision-making about the implementation of the processes, programmes and projects which affect them (Meskinazarian 2011, p.101).

Section 2.1.4 described the typologies of participation proposed during recovery. There are two approaches in participation, namely guided participation (instrumental in nature) and people-centred participation (transformative) (Twigg et al. 2001). Pelling (2007) termed the former as 'exploitative' approach and the latter 'emancipatory'. In the former approach, local communities play a key role in the successful implementation of recovery actions, while the programme design and decision-making lies with donors and NGOs. The community participation in recovery action is instrumental in successful execution. The external agencies undertake assessments to understand needs of the affected communities and design programmes based on assessed needs and agency mandates. By contrast, the second model addresses issues of power and control within programme planning and implementation (Twigg et al., 2001). Here external agencies take the role of facilitators and communities take the lead in decision making in design, implementation and monitoring

recovery interventions. People-centered participation is founded on the belief that ordinary people are capable of critical reflection and analysis, and that their knowledge is relevant and necessary (Twigg, 2004, p117).

In the context of sanitation, the top-down centralised planning that considers toilet construction as the final solution to sanitation has been critiqued, instead focus is recommended towards sustained collective behaviour change (Kar 2012). Kar argues that

‘The prevailing mind-set of planners, bureaucrats, donors and lenders is based on the assumption that people are poor and must be given free or subsidised toilets. They assume that local people do not understand the dangers of the faecal–oral contamination and so hygiene education is essential. Local people cannot construct toilets on their own; hence toilet models and technological know-how must be prescribed to them. But these top-down attitudes combined with an excessive reliance on numbers and targets are part of the problem. Solutions to collective hygiene behaviour change will not come through building toilets or providing a technological solution by outsiders but by triggering a demand that must come from within the community. What is required is a decentralised bottom-up and community-led approach’ (Kar 2012 p.95)

The monitoring of progress in sanitation is discussed in developmental WaSH contexts (Sparkman 2012; Mazeau 2013; WHO/UNICEF 2014). Monitoring changes due to the programme are challenging in post-disaster context, hence the current trends in sanitation monitoring require a holistic, people-centred approach to facilitate learning, and evaluation strategies for a sanitation system, incorporating a range of stakeholders and perspectives (Sparkman 2012). Manyena (2009) comments that terms such as capacity, learning and organising often indicate community agency. Participatory monitoring and evaluation (PMandE) approaches serve the functions of impact assessment, project management and planning, organisational building and learning, understanding and negotiating stakeholder perspectives, and public accountability (Estrella and Gaventa 1998). Fourth generation evaluation, or participatory evaluation methods, are characterised by negotiation between various stakeholders, participation in every stage of the evaluation process, and a focus on action (Guba and Lincoln 1989). There are evaluation methodologies applied during emergencies (ALNAP 2006; Vogel 2012; Few et al. 2013). These are unclear on the extent of participation as it means different things to different people (Manyena 2009). This research explores the scope and extent of community participation and multi-stakeholder partnerships in WaSH during recovery.

3.7 Integration

This research explores integration of WaSH over time from relief and recovery to development, and with other sectors. The integration as a pathway includes approaches for linking relief, recovery and development, and achieving multi-sectoral integration. Socio-ecological resilience relies on the interconnectedness between the various components of a system; linking preparedness measures to live with disasters by building redundancy within systems (Bahadur et al. 2010). As Richard Carter observes, the WaSH sector is confronted with

‘.. the challenges of linking disaster preparedness and risk reduction, emergency response, post-emergency rehabilitation, and long-term development. Getting this continuum right has long been the holy grail of both development workers and humanitarian emergency practitioners.’ (Carter 2012)

The LRRD approach highlighted aspects of temporal integration of recovery interventions (Section 2.1.3.2). Collins (2013) argues that an integrated approach is action-oriented science, based on experiences of successful disaster and development processes, which demonstrate pathways to wellbeing and linking disaster to development. This research explores ways of integrating cross-sector collaborative mechanisms and replacing cultures of competition with those of cooperation to further agreed actions (Collins 2013). In WaSH, LRRD approach has been studied to address the transitional gap in recovery programming (King 2015). Financing emergency services and strategies to manage the people’s expectations of how much assistance they can receive under which circumstances are areas of concern to ensure that humanitarian enthusiasm for making potentially life-saving interventions available does not undermine long-term sustainability (Luff 2013). The understanding of policies on tariffs, taxes, subsidies and insurance needs to be strengthened with more research (Brocklehurst 2013). It should be undertaken as a national level policy issue, that is, not just part of donor or external agency policy (Jones 2013).

This research proposes integration as a theme to understand multi-sectoral approaches in recovery, where integration is sought between sectors including shelter, livelihoods, education and health instead of stand-alone WaSH interventions. It is understood that recovery at the household level includes primary health, water, sanitation, education and livelihoods, and not just rebuilding of the houses. At the district and municipal levels, a holistic sanitation programming strategy could address issues of the lack of coordination between relevant sectors (such as housing, energy, agriculture,

and health, as well as public and private actors); challenges of leadership, and silo approaches affecting collective impact, lack of district-wide or nation-wide service delivery; and lack of opportunities to learn from and contribute to other sectors outside sanitation (Williams and Sauer 2014). A study of water systems emphasises integrated approaches to encompass all environmental factors of resources, technologies and human beings (Pahl-Wostl 2007). Particularly in the context of recovery programming, use of effective inter-cluster coordination approaches and transitional programming strategies in emergency phase was found to enhance resilience in the post-disaster environment (King 2015).

3.8 Chapter Summary

This chapter reviews resilience literature and uses systems thinking to define the conceptual framework to understand post-disaster recovery processes. The framework components are conceptualised as pathways for resilience in WaSH during recovery. This thesis investigates the first pathway for resilience - learning and knowledge – through social learning and technological interventions that complement local knowledge. These could manifest in the form of hygiene behaviour changes and technical changes. It explores the second pathway for resilience – institutional capacities – through representative mechanisms and policies, resource allocation during recovery and use of information and data. The research studies third pathway for resilience – participation – in the form of community participation and multi-stakeholder partnerships. The thesis explores the last pathway for resilience – integration – by understanding approaches for linking relief, recovery and development, and multi-sectoral integration.

Chapter 4: Methodology

This chapter describes the exploratory strategy used for addressing the research questions and multi-sited case studies (Section 4.1). The tools for data collection include participatory learning and action (PLA) tools, interviews, documents and participant observation (Section 4.2). As a practitioner, I reflect on the actions undertaken with Agency A, and discuss the biases and ethical issues while undertaking this research (section 4.3). The data analysis strategy included mind maps, thematic and contextual analysis (Section 4.4).

4.1 Research strategy

This research adopts a qualitative strategy from an inductive, interpretative epistemology and constructivist ontology to study human behaviour post-disasters. I use an exploratory strategy to understand and explain social phenomena, and focus attention on particular issues regarding the social and natural worlds (May 1993). It is situated within epistemological and ontological aspects to understand community resilience to disasters. Epistemology considers the questions of what is regarded as knowledge of reality, and how we study it; ontology refers to the nature of social reality, which is either objective or socially constructed (Bryman 2008). In this qualitative research, I adopt a methodology that focuses on the meaning, complexity and connectivity of social phenomena (Silverman 2006). The research involves perspectives from various stakeholders' and the researcher's social realities based on their experiences.

To study multiple perspectives involving different actors from government and NGO officials to communities and household members, this research uses multiple methods for data collection, such as focus group discussions (FGDs), interviews, actor mapping, participatory change analyses and priority ranking exercises, where appropriate. Participatory Learning and Action (PLA) tools during field research are helpful to acquire the closest possible perspective of the community. Chambers (1995) warns that despite our best efforts, an outsider cannot grasp all the dimensions of rural life. Initially named rapid rural appraisal (RRA) and participatory rural appraisal (PRA), these tools are defined as 'a family of approaches and methods to enable rural people to share, enhance, and analyse their knowledge of life and conditions, to plan and to act' (Chambers 1994a, p.953). These are used to gather information directly from the people impacted by disasters to form an integrated vision of their lives and needs (Guijt and Cornwall 1995). PLA tools have advantages of directly

learning from local people, and seeking diversity by facilitating analysis by local people; practicing critical self-awareness and responsibility; and sharing (Chambers 1994b).

This study asks '*How effectively do different approaches to water and sanitation facilities, and hygiene practices during post-disaster recovery promote community resilience*'? This question is broken down into three subsidiary research questions.

1. How can the existing policies in WaSH and recovery be strengthened to incorporate resilience in WaSH? Furthermore, how can these policies be effectively translated into practice?
2. How can learning, knowledge, and participatory approaches help in translating the window of opportunity available during recovery into action?
3. How effectively do agencies facilitate the integration of emergency response with long-term development across different sectors?

4.1.1 Research Process

The exploratory process of this research included initial conceptualisation through literature review (Chapter 2), framework development and validation through expert interviews (Chapter 3) and three stages of fieldwork in Assam and one in Odisha. There were two major events that influenced the research strategy and the choice of methods: when the floods recurred in Assam, and when I was deployed with Agency A in Odisha after Cyclone Phailin for 6 months. In Assam I began fieldwork in Solmari, when the floods occurred in July 2012. This was followed by two visits in 2013: a scoping study, as a volunteer with Agency A during January - February 2013, and an independent study from August - October 2013. In September 2013, Morigaon, one of my case study villages, was flooded again due to a breach in the embankment and communities were displaced. As a result, I discontinued my research in Morigaon. In Odisha, Cyclone Phailin hit Odisha on 12th October 2013, and I was deployed by Agency A on 19th October until 8th March 2014 in Puri (see Table 4.1). This research used participatory processes of data collection, during involvement with agency A in Assam and Odisha. This ensured scope for communities to express their willingness to address some of the problems that affect them (Estrella and Gaventa 1998).

Table 4. 1: Research Design: Timeline of activities

Conceptualisation Stage	
Literature review and research questions	October 2011 - May 2012
Conceptual framework and experts' interviews	August 2012- May 2013
Design data collection protocol	July 2013
Data Collection – Case Study Approach	
Assam floods preliminary assessment visit	June - July 2012
Scoping study – 2nd field visit to Assam and field report	January - March 2013
Empirical data collection – 3rd field visit to Assam sites	August - October 2013
Deployment in Odisha Cyclone Phailin and floods	October 2013- March 2014
Findings and Interpretation	
Data management, and mind map interviews Identifying themes and recurring patterns Triangulation and context analysis	May – December 2014
Presentation of Findings	
Report and analyse findings	January – April 2015
Revisiting conceptual framework	June 2015
Writing up thesis	June – August 2015
Feedback and incorporation of suggestions	September 2015
Submission of research	December 2015

The first visit to Assam in July 2012 was immediately after the floods started, as part of an emergency needs assessment team commissioned by a UN agency to understand the extent and aftermath of the floods in various districts. I visited Solmari village in Sonitpur district to understand the impact of floods on WaSH, and the emerging needs and urgent priorities. I explored issues related to flood damages, water and sanitation facilities, consequences of floods for communities, facilities at camps, emerging needs for women and children, government response and preparedness measures. While undertaking the assessment, I was aware of my role as a researcher. I used this opportunity to document the community needs and develop Assam as a case study for further research. This visit strengthened the argument that WaSH was a priority in emergency, and provided an opportunity to document the recovery processes. I undertook five FGDs at the relocated areas and camps, and four interviews with government officials; along with photographic evidence of damages and displaced living conditions in camps.

During my second visit to Assam for a scoping study in January – February 2013, I visited Sonitpur and Morigaon districts as a volunteer with Agency A. The purpose of this visit was to build rapport

with different actors in the field including community leaders, *panchayat* leaders and NGOs working in the area. I was introduced as a researcher to the project staff and community members, who were informed that I would revisit later in the year to understand community recovery and resilience. The community facilitators in the programme acted as local translators during my visits. This provided me with an opportunity to learn Assamese language, and familiarise myself with the local culture and context. During the scoping study, I gathered staff perspectives, and information on Agency A interventions. Agency A provided logistics support for my research, as I supported them with report writing and undertaking a WaSH KAP (knowledge, attitudes and practices) end line survey. The results were compared with the baseline survey to indicate changes in household WaSH practices. I was also part of the real-time evaluation (RTE) exercise and workshop with Agency A, which provided insights on community feedback about the programme. The initial findings from this visit influenced the research as follows:

- I identified and selected the *panchayats* and villages for my fieldwork: Solmari in Sonitpur and Boramari Kacharigaon in Morigaon. These were selected based on the extent of damages faced during the 2012 floods, close proximity to Brahmaputra, and agency A interventions.
- The local terms for floods and rains – *banpaani* and *borokhun* respectively – clearly distinguished between heavy rains and floods. Floods occur due to heavy rains leading to rise in the water levels of Brahmaputra, which causes overtopping and breaches the embankments.
- I used semi-structured interviews with key informants as useful tools to gather data, and in-depth interviews with households. These allowed the interviewees to offer what May (1993) calls their own ‘frames of reference’ (p.94). It was easier to hold relatively less structured interviews with household members to discuss issues that were close to their lives, and speak about how disasters changed their practices, their aspirations and plans for recovery.
- During translation, it was convenient if I knew the local terms for key concepts such as resilience, recovery and floods. Accordingly, I briefed the community facilitators (who acted as translators) about such concepts. This was crucial because it shaped the understanding of resilience – bringing together community approaches, and how these fit within existing literature and my research framework. In Assamese translation, resilience is purported to be structural protection and mitigation measures, and recovery means rebuilding to previous conditions. The programme staff explained these subtle differences to me, which helped me to refine my

concepts colloquially, and frame them within community and stakeholders' perceptions of resilience and recovery.

- During my first two visits, I found that community priorities changed as time progressed; the reported importance or need for WaSH facilities varied. It was important to record these priorities and changes expected from agency interventions.
- I maintained daily records of observed changes and understanding through informal discussions with Agency A staff and community members in a field diary as part of a reflective process. These field notes yielded insights into daily life and contextual analysis.
- Time was discussed in relative terms, 'before' and 'after' and 'from time to time'. When asked more specifically, individuals were uncomfortable to suggest precise dates of events.
- Government of Assam was dealing with multiple flood waves across 17 districts, which was followed by incidents of violence and conflict in Kokrajhar and Chirang in 2013.
- Working with Agency A and the support I received for fieldwork was invaluable in accessing the remote villages. My role as a volunteer provided independence to conduct research and approach local actors, who might otherwise have been difficult to contact or engage. However, this association with Agency A raised expectations with the communities, so I specified my role and clarified the purpose of the study during my introduction.

The final fieldwork in Solmari and Boramari, Assam was undertaken in August - October 2013. I found that flood protection measures had exacerbated community vulnerabilities: the embankment divided the village and exposed the communities to floods and erosion. The riverine communities in Solmari and Boramari were forced to relocate when the new embankment put them on the 'wrong' side of the embankment without any protection from the river. Agency A programme operations had ended in these villages in Sonitpur and Morigaon in April 2013. During this visit, I engaged with the community to understand their story – attempts to recover from the 2012 floods – preparedness measures for the impending floods in 2013, and changes in WaSH facilities and practices. I spent three months focusing on the displaced communities in Solmari and Boramari, who were living on embankments and flood platforms. In Boramari the entire village was washed away, and the populations were displaced. This visit provided crucial insights into community capabilities to overcome challenges of relocation and recurring disasters. The fieldwork involved gathering multiple perspectives using various tools from households, communities and government

officials, local NGOs and humanitarian agencies. In Boramari, the fieldwork had to be stopped when the new embankment was breached in Boramari village on 14th October 2013.

In Odisha, I undertook an extended fieldwork of 6 months to develop a supplementary case study. Cyclone Phailin and subsequent floods in 2013 had affected 12 million people directly or indirectly (Dash 2013). The study districts included Puri and Balasore. I was deployed as Agency A's programme officer/team leader and my role involved decision-making, emergency kit distribution and implementation of WaSH programmes in Puri. I undertook a separate monitoring visit to Balasore in March 2014 – 6 months after floods had affected the district – where Agency A had supported the local partner Agency F for food and hygiene kit distribution, emergency shelter, water supply and bathing space installation. As a practitioner in Odisha I assessed community needs, and undertook programme planning after the cyclone through discussions with the communities, local NGOs and government officials. During the first phase of the response (October - December 2013), the field visits took place 6 days a week. A total of 15 villages were targeted for undertaking distribution to 2000 households. I also facilitated community discussions during donor and senior management monitoring visits. These visits were useful to understand the existing community capacities to respond and recover from the cyclone.

Odisha was useful to gain a critical perspective on the *differences* in WaSH practices and recovery processes across different villages, and the impact of agency support on recovery. The tools used for data gathering included household interviews, observations, transect walks, focus group discussions, village mapping, participatory change analyses, and priority ranking exercises. The methods for data collection in Odisha varied from Assam: as a practitioner it was challenging to maintain a neutral stance and academic rigor in Odisha. The following shows how the experience in Odisha shaped this research:

- The villages involved in Puri were categorised based on geographical location depending on ease of access and programme operations. These included coastal, island and mainland villages (see Chapter 6)
- As an agency representative, the community expectations could have potentially influenced the information they provided during assessments and monitoring visits, which is used in the thesis.

- Emergency response warranted immediate measures to save lives. For quick distribution of emergency kits agencies used either the targeting approach (reaching out to most vulnerable and affected community groups) or adopted blanket approach (reaching out to all the households in a village irrespective of damages).
- I learnt that call for proposals for recovery by donors were required to be submitted within the first few weeks of the disaster; Agency A incorporated the recommendations from Assam real-time evaluations (RTEs) in Odisha. Agency A intervened in early recovery under the consortium-model approach in Assam and Odisha.
- The media reports showed government was successful in saving lives during the cyclone through preparedness measures, early warning and evacuation systems. However the field reality indicated there were gaps and delays in government relief items reaching the affected communities.
- The State machinery and human actors dealt with secondary/multiple disaster such as cyclones and floods affecting different districts at the same time in Odisha, similar to what I observed in Assam as well – conflicts, recurring floods and erosion.

Some inputs from secondary sources indicated the following information on Odisha:

- The region is prone to multiple hazards and has a long history of multiple disasters due to its geographic location, political disturbance, and ineffective disaster policies (Ray-Bennett 2009a).
- Studies from Odisha have examined the role of diversity and complex interplay of caste, class and gender in surviving multiple disasters (Ray-Bennett 2009b).
- The 2011 census shows only 14.1% of rural households in Odisha have access to sanitation facilities, and 85.9% practice open defecation (Census 2011). Odisha is one of the states with the lowest household toilet access (Mommen and More 2013).

4.1.2 Case study approach

This research used multi-site case studies to explore WaSH and community resilience. A case study approach is useful depending on research objectives, clearly defined universe, and for focused exploration of a phenomenon (George & Bennett 2005) A case is an exploration of a 'bounded system' (bounded by place and time) to study a programme, event, activity or individuals (Creswell 1998). Using a case study approach differed from the traditional positivist approaches that divorced phenomena from context by minimising or controlling the context to isolate the effect of a relatively

small number of variables (Yin, 2009). But in this research the phenomenon and the context were considered. This research adopted case studies so that it 'benefits from the prior development of theoretical propositions to guide data collection and analysis' (Yin 2009 p.14). This research found case studies helpful in guiding 'an empirical inquiry that investigates a contemporary phenomenon within its real life context' (Yin 2009, p.13). The phenomenon included disaster events and recovery actions by households, communities, INGOs, government actors, and local institutions.

The case study approach helped in addressing the complex issues and variables encountered during the fieldwork; it allowed use of wide range of methods and sources of evidence without constraining oneself to a pre-determined selection of tools and techniques (Yin 2009). With regard to the misunderstandings of case study research stated by Flyvbjerg (2006), this research relied upon theoretical knowledge and practical knowledge, and was consciously aware of the dangers of generalising from the cases.⁵ The approach seemed appropriate to explore the recovery processes, and understand WaSH in order to address the research questions. The research benefitted from case studies for learning that provides depth, not breadth, and as narratives in their entirety not with an aim to summarise or generalise (Flyvbjerg 2006).

Case studies are categorised depending on the number of cases and sites of study. This research explored recovery using two case studies from India, and within each case multiple sites were studied to understand WaSH practices. According to classification provided by Stake (1995), this research uses collective and intrinsic types of case study. An intrinsic case study helps in gaining a better understanding of a particular unique case and a collective case study includes a number of cases in order to inquire into a particular phenomenon (Stake 1995). The Assam case study was also longitudinal as it attempted to explore recovery a year following the floods in 2012.

4.1.3 Selection of case studies

To explore the research question across the two cases, data were required on a number of levels: household, community, NGO and government (Greene 2014).

⁵ Other misunderstandings state that generalisations cannot be made from a single case, or a case study is most useful in pilot stages to generate hypotheses, or case studies are biased towards verification of the researchers' hypothesis, and are difficult to summarise (Flyvbjerg 2006).

- Household level: Data were collected through interviews and observations to explore changes in WaSH practices during recovery. It included household perspectives and decisions regarding investments in WaSH post-disasters.
- Community level: WaSH communal facilities were observed in order to understand their use and maintenance, and accessibility issues. Data included community priorities and changes, and perspectives from the local actors and CBOs.
- NGO level: Data were collected from humanitarian NGOs regarding response and recovery measures in WaSH and information on programmes through documents, interviews and notes.
- Government level: Qualitative data on district, state and country level disaster management policies and water and sanitation schemes were collected to gain a macro-level overview of WaSH and disasters.

The sites for fieldwork in Assam and Odisha were selected based on the following criteria:

- Since community capacities and changes post-disasters were to be studied, villages affected by floods, cyclone or erosion were selected.
- As the sub-research question investigated the role of institutions, the selected sites were part of Agency A and their local partner NGO's intervention areas.
- In order to maintain uniformity across diverse community groups, similar locations were considered, where the selected groups lived on the rural fringes, exposed to recurring disasters due to their geographic locations and proximity to rivers and lakes.

The initial study was funded by an Erasmus Mundus Exchange scholarship: the primary condition was to conduct the research in my native country – India. The first case study focuses on flood-affected communities in Assam. Assam has an average annual rainfall of 2,546 millimetres, one of the highest in India.

Table 4. 2: Selection criteria within Assam

Area	Criteria	Sites considered	Site selected	Reasons
State	1. Disaster-prone region	1. Cyclone Aila, West Bengal 2009	Assam	1. Recurrent floods in 2012

	<ol style="list-style-type: none"> 2. Experience of recent event 3. On-going response work 4. Appropriate for independent researcher 5. WaSH context 	<ol style="list-style-type: none"> 2. Maharashtra 3. Assam 		<ol style="list-style-type: none"> 2. History of floods 3. Access with Agency A 4. Initial assessment team member 5. Rampant open defecation rates
Districts	<ol style="list-style-type: none"> 1. Affected by floods in 2012 2. Past disaster history 3. Agency A on-going work 	<ol style="list-style-type: none"> 1. Lakhimpur 2. Dhemaji 3. Sonitpur 4. Morigaon 5. Bongaigaon 6. Chirang 	Sonitpur and Morigaon	<ol style="list-style-type: none"> 1. On-going flood response 2. Recommended by NGOs and GOs 3. Previous visits and familiarity with local actors 4. Others were difficult to access or conflict-affected
Villages	<ol style="list-style-type: none"> 1. Riverine communities 2. Flood affected 3. Similar Agency Interventions 4. Hazard history 5. Diverse community demography 	<ol style="list-style-type: none"> 1. Solmari 2. Boramari 3. Maihang block 	Solmari and Boramari	<ol style="list-style-type: none"> 1. Agency A intervened in shelter, WaSH and livelihoods 2. Prior contacts and established rapport

The Brahmaputra river basin in Assam is extremely prone to floods, characterised by regular erosion and devastation during monsoons. Assam has a high rate of open-defecation, as per 2011 census; only 59.6% of total households have toilets (Global Sanitation Fund 2013). Solmari and Boramari villages both Agency A intervention areas were selected for the research. The households were randomly selected to reflect the diversity in communities.

The second case study focuses on cyclone- and flood-affected communities in Odisha (see Table 4.3). Cyclone Phailin affected Ganjam and Puri districts in Odisha, while the subsequent floods affected Balasore.

Table 4. 3: Selection criteria in Odisha

Area	Criteria	Sites considered	Site selected	Reasons
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State	<ol style="list-style-type: none"> 1. Disaster-prone region 2. Experience of recent event 3. On-going response work 4. WaSH context 	<ol style="list-style-type: none"> 1. Odisha 2. Andhra Pradesh 	Odisha	<ol style="list-style-type: none"> 1. Cyclone Phailin and subsequent floods in 2013 2. Access with Agency A 3. Initial assessment team member 4. Rampant open defecation rates
Districts	<ol style="list-style-type: none"> 1. Affected by cyclone and floods in 2013 2. Past disaster history 3. Agency A on-going work 	<ol style="list-style-type: none"> 1. Puri 2. Ganjam 3. Balasore 	Puri and Balasore	<ol style="list-style-type: none"> 1. On-going Agency A response 2. Deployment in Puri 3. Monitoring visit in Balasore
Villages	<ol style="list-style-type: none"> 1. Riverine/Coastal communities 2. Flood affected 3. Similar Agency Interventions 4. Hazard history 5. Diverse community demography 	<ol style="list-style-type: none"> 1. Arakhakudda 2. Sanpatna 3. Khirisahi 4. Brahmapur 5. Mahinsha 6. Padanpur 7. Pirosahi 8. Gopinathpur 9. Kanas block 10. Sahadevpur 11. Chadanamkhana 12. Gombhoria 	Puri: Arakhakuda, Sanpatna, Khirisahi Brahmapur Padanpur Pirosahi Gopinathpur Sahadevpur Balasore: Chadanamkhana Gombhoria	<ol style="list-style-type: none"> 1. Puri: villages were accessed for the response programme and categorised as coastal, inland and island 2. Balasore: Affected by floods in 2013, and erosion

The selection of two case studies where disasters had recently occurred provided a unique opportunity to witness, document and study recovery as it unfolded. The higher rates of open defecation in Assam and Odisha prior to the disaster provided the context to understand post-disaster changes in community practices and approaches used by agencies to promote community resilience during recovery. Floods, cyclone and erosion had affected the selected study sites, hence following the communities living in these areas over time was helpful to study the changes occurring during recovery. My previous association with local agencies working in Assam and interest to understand the context had led me to follow the case study when the floods first occurred in 2012. In Odisha, the cyclone 2013 was another interesting avenue to understand how Odisha evacuated and responded to the needs prior to the onset of the cyclone. The state machinery had learnt lessons and implemented preparedness and mitigation programmes after the previously 1999 Supercyclone, which had been instrumental in saving lives. This multi-disaster event suited the research aims to understand community recovery from a mega-scale event.

4.2 Data Collection Methods

Several inter-dependent methods were chosen that complemented one another to draw a meaningful analysis of changes (see Figure 4.1 and Table 4.4) This aided external validity and built a more complete picture of household and community recovery and WaSH practices. Field notes and a daily journal were maintained to manage internal validity and develop reflexivity.

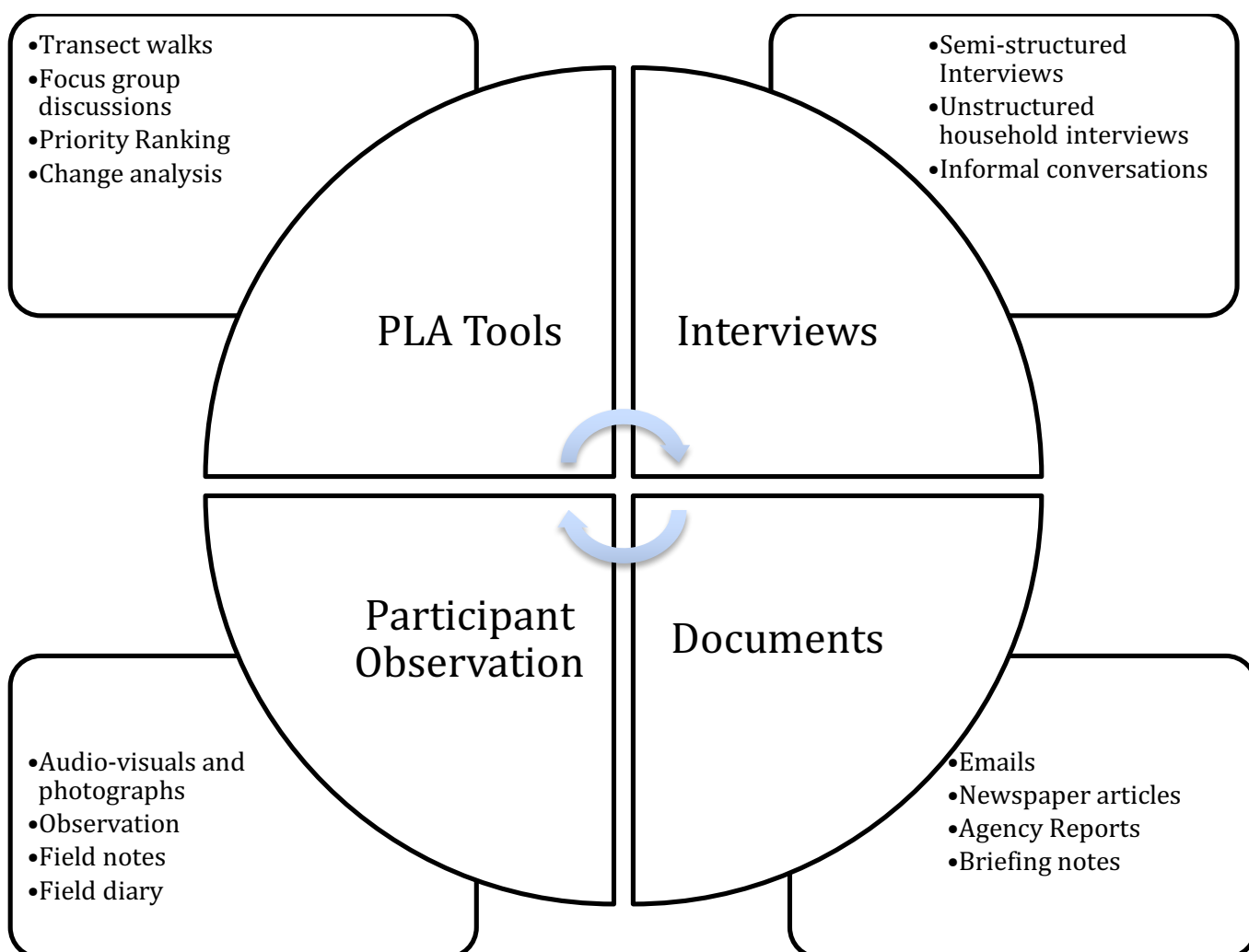


Figure 4. 1: Integration of different methods

Table 4. 4: Research methods used in Assam and Odisha

Name of the tool	Assam	Odisha	Sub-Research Questions		
			1	2	3
Participatory Learning and Action Tools					
Transect walks	12	23	√		
Participatory mapping exercises	4	20	√		
Focus group discussions	23	43	√	√	√
Participatory change analyses	4	4	√		√
Priority ranking	4	16	√		√
Interviews (see Table 4.5)					
Key informant interviews				√	√
Household interviews			√		
Documents (see Annex 13)					
Observation and photographs			√	√	√

4.2.1 Participatory Learning and Action (PLA) tools

In this research, participation is important in the conceptual, methodological and analytical aspects. For data collection, PLA tools were used to gather data on the impact of disasters in WaSH systems. There are myriad interpretations of participation, and challenges and criticisms levelled against these approaches (Guijt and Cornwall 1995). Schilderman and Lyons (2011) question, ‘whose participation in whose decisions and whose actions?’ (p.227). This research uses PLA tools to gather multiple perspectives, and to document the lived realities of people recovering from disasters. This involved purposive sampling of respondents for community and household members. For key informants – NGO and GO staff, and local actors – detailed knowledge and experience of working in the region was essential. The use of PLA tools for data gathering and interactions with local communities, as shown by Le De et al (2014), faces constraints of time and distance. PLA tools are less likely to deliver answers to local communities’ problems or empower them; they are intended to serve the research (or the researcher and programming) interests.

This research contends that using PLA tools in itself cannot bring about positive change. Agencies rely on participation as a means to extract information from a community (Guijt and Cornwall 1995). A growing number of studies use participatory methods in evaluation, urban studies and climate resilience (Chambers 1994a; Burke 1998; Estrella and Gaventa 1998; Twigg et al. 2001; Moser and Stein 2011). Chambers (1994a) discusses sequencing of tools starting with mapping, followed by

priority ranking, stakeholder mapping and wealth ranking. Mikkelsen (2005) groups PLA tools based on space, time and relational parameters. Space-related PLA tools such as mapping and modelling aid in exploration of spatial dimensions of people's reality; time-related such as seasonal diagrams, work-activity daily schedules, time-lines and trend analysis tools enable communities to use their own concept of time to explore temporal dimensions; and relational tools including Venn diagrams, matrix scoring/ranking methods are used to study relationships between various items or aspects of same item (Mikkelsen 2005).

The PLA tools used in this research included participatory mapping, transect walks, priority ranking, actor mapping, and participatory change analyses and focus group discussions (FGDs) (Mikkelsen 2005 p.63). During fieldwork I followed a line of inquiry (annexure 7). The PLA tools were used to assess community priorities and allowed engagement with community participants, based on the data needs, opportunities and limitations of the field setting, and constraints of time, logistics and other resources (annexure 8). Separate FGDs were held with women, men and children, and with elderly or disabled members, where appropriate and feasible. The PLA tools used during fieldwork were intuitive, and respected cultural practices (Le De et al. 2014). During my engagement, I was conscious of my limitations in using participation as a means to give a voice to everyone. The tools for priority ranking and participatory change analyses were intended to draw active participation of local communities in the production of knowledge, in how they framed their problems and challenges that affect their lives (Freire 1970). Le De et al (2014) argue that participation is a process and sometimes research projects are limited in their capacity to empower local communities. Used in such a manner, these tools are limited in bringing about social change, self-reliance, or capacity of negotiation with power structures.

Transect walks: Transect walks were initiated during every field visit with a few community members to understand visible changes in geographical layout, WaSH facilities and practices, to gauge distances between households and WaSH facilities. During disasters, transect walks helped to assess the extent of damage in remote locations with the communities and understand issues of accessibility and availability of WaSH facilities. These were undertaken throughout the site, while taking notes on sanitation facilities and practices, and taking photographs. A huge amount of information can be gathered in this way but care should be taken not to make sweeping assumptions based on limited observation (Harvey et al. 2002 p.17). This high-profile walk dispels

suspicion of outsiders and informs researchers about areas that have greater vulnerability to severe weather (Moser and Stein 2011). I was cautious not to advise communities during the walks and asked open-ended questions (Chambers 1994b).

In Assam, frequent visits within the same communities led to 12 transect walks in two sites, while in Odisha, 23 transect walks were undertaken along with project participants. I faced challenges in accessing the villages depending on the time to travel and available means of transport, weather conditions and inundation during floods. The walks allowed a snapshot of the existing WaSH facilities, agency interventions and the manner in which the communities accessed water, sanitation and housing facilities post-disasters. I used other methods such as observation, interviews and group discussions as a way of triangulating data.

Participatory mapping: This research included participatory mapping exercises – village and actor mapping – to obtain an overall view of the physical situation and relevant actors in WaSH. This research developed a list of actors involved at the village/settlement level in WaSH service provision (Figure 4.2).

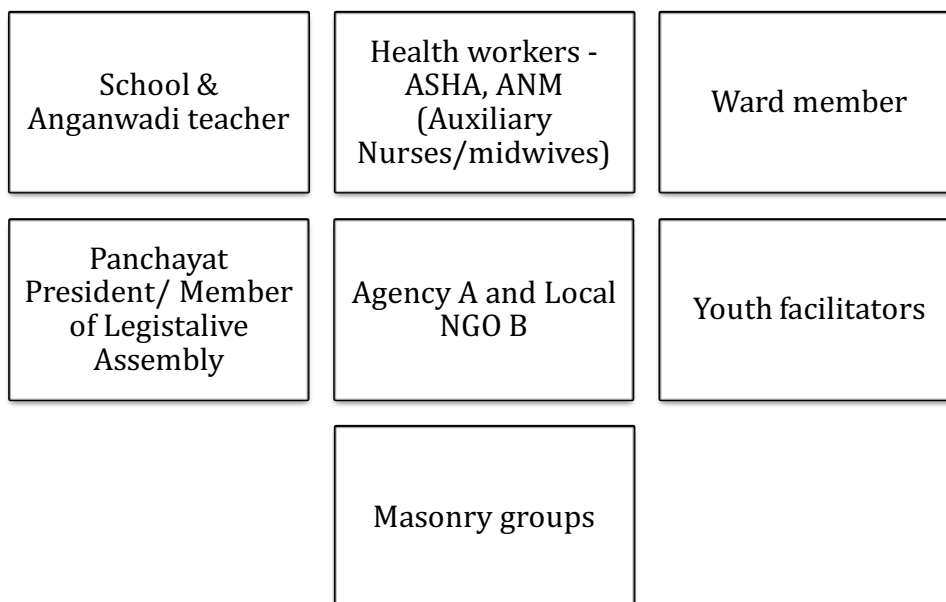


Figure 4. 2: List of actors involved in water, sanitation, and hygiene services in Solmari

Actor maps have been used to record the types and strengths of social networks experienced by the respondents in other studies (Bosher 2005; King 2015).⁶ This involved developing rough sketches of site plans or schematic maps of existing WaSH facilities; key public services and institutions; indiscriminate disposal of excreta, flood-prone areas, water sources, storage and distribution points; and slopes, drainage and geological features (Harvey et al. 2002 p.17). Community members and/or local staff undertook village mapping to stimulate discussions and obtain information. The maps indicate equal weight to all actors, when in fact they had different roles, and functions.

Focus Group Discussions (FGDs): This research used FGDs to determine common needs, timeframes and priorities with communities. This helped to frame the context and gain insights regarding the situation, followed by two other exercises, priority ranking and participatory change analyses. Following the principles set by Harvey et al (2002), this research conducted focus groups separately with women members to discuss issues of menstrual hygiene, hygiene behaviour and privacy concerns over use of water and latrine facilities during emergencies. The discussions were held in any available sheltered space – schools or local communal areas – involving 6-8 informants. FGDs can be challenging, as they can be distorted by peer pressure or by certain participants who, because of their personality, interest or competence in discussions, may dominate a group and others might feel intimidated, hiding the differing views and disagreements between participants (Gough et al. 2013). These difficulties were countered by facilitating subsequent smaller group discussions with relatively homogeneous participants (i.e. of the same sex and similar experiences), or with household interviews. This research conducted separate FGDs following similar work to factor different perspectives and vulnerabilities which influence access (Nieuwenhuys 1997; Twigg 2014).

For research purposes I facilitated the discussions, sometimes with the help of Agency A management or field staff. For programming purposes, at different stages of the programme cycle, the purpose of the FGDs varied: during assessment, information gathered was specific to emergency food, water, sanitation and shelter needs; during monitoring visits, FGDs were held to discuss the effectiveness and gaps in the programme; and regular FGDs were held to gather community

⁶ The Sociogram is a survey tool that aims to quantify the level of resilience experienced in a community before and after a disaster; to assess the types and strength of social networks experienced individuals within an 'every day' context and within a 'crisis period' (Bosher 2005; King 2015). Bosher (2005) categorised the types (formal/informal) and weighted the strength of relationship between the respondent and the various institutions and organisations accessed inside and outside the respondent's village.

feedback and complaints on the programming services and assistance. Overall 23 group discussions were held in Assam over three visits in 2 sites, and 43 in Odisha across 10 sites. Due to the longitudinal nature of the study, multiple FGDs were held in the same sites; the group composition varied sometimes because participants were absent due to relocation, migration or busy with their livelihood activities. Where women members were involved in the discussions, efforts were made to organise the groups in their previous cohorts based on proximity. I took notes during the meeting, or immediately afterwards. The FGDs were not recorded.

Priority ranking: In each study village, after the FGDs priority ranking exercises were undertaken as a sequential task, in which the participants listed their immediate and urgent needs, priorities and issues faced during recovery. The participants were requested to list their urgent concerns and accord importance to each need or priority through consensus and priority setting approach. This generated conversation about the role and importance of various sectors such as housing and land, water, sanitation, livelihoods and health, encompassing future development and risk reduction measures. Participants prioritised, modified and revised their answers as the importance of each sector on the list was discussed and debated. In Assam this exercise was undertaken during my final visit in September 2013, and in Odisha, this was regularly used to determine dynamic changes in the humanitarian needs for programming. As the groups contained mixed gender groups, a variety of needs were listed and different priorities were mentioned. These differences were noted in the field diary. Due to time constraints participants were asked to list five important priorities. To counter challenges faced by the participants who were not literate, I used pictorial representations, drawn on the ground showing water source, toilet or house or land, livelihoods or embankments.

Participatory change analyses: The change analysis format was developed based on the guidelines for contributing to change methodology presented in Section 2.1 (Few et al. 2013). It looked at the major recent disaster event in the region and tabulated various aspects related to WaSH facilities and practices, shelter, population, livelihood and migration patterns, access to health and presence of various organisations and service providers. In this research a timeline of the village profile was produced before, during or immediately after the disaster, and during recovery. Sword-Daniels et al (2015) faced challenges of eliciting accurate recall from past memories, while using timelines to collect qualitative data. Participatory change analyses tool is useful to gather rich data to explore retrospective changes in household location, WaSH practices and access to WaSH facilities. Instead

of determining specific timescales such as 10-12 days after the disaster or 3 or 6 months after the disaster, this exercise referred to phases:

- t-1 Prior to the floods – pre-disaster context
- t-2 Emergency phase during the disaster (approximately 10 days – 2 months)
- t-3 Early recovery phase during the first assessment visit (approx. 2 months – 6 months)
- t-4 Longer –term recovery phase when the floods recurred (approx. 7 months – 1 year)

In Odisha, the last phase was not explored because the fieldwork lasted for six months after the cyclone.

4.2.2 Interviews

This research relied upon interview method for gathering data and analysis, as an effective tool for descriptive and analytical purposes, and to situate the data in their fuller social and cultural context (McCracken, 1988, p.9). Following McCracken (1988), this research adopts investigator (or researcher) as an instrument (self as instrument) to understand the social phenomena. During fieldwork, semi-structured interviews were used at the household level and with key informants. This allowed for flexibility and the discovery of meaning of the participants, and provided greater understanding of the households' point of view (May 1993, p.94).

At the household level, relatively less structured and guided conversations were held to collect rich information, ranging from 20 minutes to an hour with the household members, for acquiring rich accounts about their lives after the disaster, WaSH practices, post-disaster changes and experiences during recovery. An unstructured format was preferred over a structured survey/interview format, without recording. The houses were randomly selected across separate clusters within a village to get geographically diverse perspectives and practices. In Assam, 18 households across two villages were purposively sampled for interview based on gender, ethnicity, age, and those living along the riverbanks, and on the embankments. In Odisha, 10 household interviews were held with households. Sometimes a translator was present; both Assamese and Odia languages – both being similar to Hindi – were easier to grasp and learn for me. This allowed me to communicate without an interpreter or translator. In the beginning, I introduced myself, and the purpose of the interview, and took verbal consent from the respondent. The informality and casualness of the discussions aided the respondents to freely express, confide and discuss issues pertaining to their daily lives. Some of the issues discussed included: how do different vulnerable groups such as elderly, children,

women and disabled members access water sources, their defecation and handwashing practices and how these changed post disasters (Annexure 7).

On the other hand, semi-structured interviews were held with key informants, involving Agency A and local NGOs. In Assam 38 semi-structured interviews were undertaken with NGO staff and experts, humanitarian and government officials using an interview guide (Annexure 9). Other stakeholders – local leaders, government officers, heads of local organizations, and schoolteachers – were also interviewed. In Odisha 36 interviews were conducted with key informants. I conducted all the interviews, and voice-recorded after seeking the respondent’s permission and signed consent allowing me to use the information for research purposes (Annexure 6). The interviewee had the right to remain anonymous so that they could freely provide their inputs and opinions, as per the UCL ethics guidelines. The interviews lasted between 40 minutes and one hour and interviewees were asked to provide any feedback or contributions or ask questions towards the end. Some of the scheduled interviews were cancelled or discontinued and held at a later date due to limited availability of the interviewees and their time constraints. Sometimes due to time constraints, interviewees offered to have informal conversations, meetings or Skype (Table no 4.5). In all **144** interviews were conducted with households, NGO officials, government and other actors.

Table 4. 5: Summary of interviews across case studies

Interviews	Assam	Odisha
Household interviews (A)	18	10
Interviews with State Authorities	2	2
Interviews with District Authorities	10	2
Interviews with Block Officials	2	1
Interviews with Gram Panchayat members	3	5
Interviews with NGOs	14	3
Interviews with INGOs and donors	1	7
Interviews with school teachers and CBOs	3	10
Meetings with consortia members	2	5
Real-time evaluation field visits and workshop	1	1
Interviews – Total (B)	38	36
Informal conversations (C)	10	12
Interview with Agency A staff (D)	10	
Grand Total (A+B+C+D)	144	

The interviews were recorded and transferred on my computer. I had taken notes during the interview to mark important themes, and pointers if I wished to probe any particular strand that

may have been missed. All the information about each interview was incorporated into the database in Excel and codified to maintain the anonymity of the interviewee. These interviews were then played back for mind mapping (Fearnley 2011) (section 4.4).

4.2.3 Documents

Documents were key sources of evidence in both the case studies. During the association with Agency A, I had access to internal reports, and other documents generated after meetings, discussions and sitreps. I accessed Agency A's and partner NGOs' records, accounts, institutional mission statements, annual reports, budgets, evaluation of project reports, minutes of meetings, internal memoranda, policy manuals, case studies, institutional reports, official correspondence, demographic material and various survey data and reports, mass media reports and presentations, and descriptions of programme development and evaluation. A separate hard-drive was maintained for systematic organisation of documents collected, and for maintaining a database. A thematic analytical strategy was used to review documents, assess the usefulness and relevance of different documents. Quite often, documents serve as substitutes for records of activities that the researcher could not observe directly (Fearnley 2011). Since documents are often written at the time of the event or shortly after they tend to preserve knowledge and views at the time of writing while information is fresh in people's minds (Fearnley 2011). The documents gathered from organisations in Assam, and Odisha were classified as government documents, NGO documents (separate folders for Agency A and others), and email communications, journal and newspaper articles, published and unpublished studies. Overall **195** documents were gathered and reviewed from Assam, and **175** from Odisha (see Annexure 12). News articles were searched in local newspaper's online databases – Assam Tribune, and Orissa Post referring to the specific disaster events.

4.2.4 Participant observation and photographs

This research also depended on participant observations recorded in my field notes and journal and in photographs to construct the complex realities and changes in a post-disaster context and document my reflections of the experience. Participant observations helped understand short-term account of post-disaster contexts and agency interventions aiming to produce a rich understanding of people's experiences in a variety of contexts (Brockmann 2011). The observations included changes in geographical layout, practices, facilities, displacement patterns and camp conditions. Specific observations were made of practices on water collection, treatment, storage and usage and

defecation. During the fieldwork, whilst actively participating in the programme I recorded my observations and interviews in field notes and separately recorded personal reflections in my researcher's journal on a daily basis. This practice allowed me to consolidate daily experiences and perspectives gathered during discussions. The objective was not just to simply record and describe events and activities but also to initiate the first level of analysis through my reflections. I referred to verbal and email communications, non-verbal cues observed during meetings and workshops. I maintained a daily log of activity description, location, date and time/duration, content of the activity and interactions between participants. Reflections, outcomes and follow up actions were also included wherever appropriate. In Odisha, I recorded my participant observations, interactions and discussions with staff, emails, daily updates, meeting minutes and reports. These proved valuable and enriching sources of data on how decisions were made, which would not be evident from interviews or discussions. Field notes were useful alternatives to voice recording, and rich description for photographs.

Images and recorded videos provided an in-depth understanding of a particular programme intervention, practices and topographical changes post-disasters. Photographic research methods have been applied in multiple ways depending on the role of the photographs in the research design, the philosophical orientation of the researcher and role of participants to capture changes (Ray and Smith 2012). Such researcher-driven tools are a rich source of information for documenting changes in the sites over time in Assam and Odisha. Especially in erosion-affected areas of Assam, this proved crucial to understand the extent of damages, population displacement and relocation challenges. These photographs were included in a database of pictures – 300 in Assam and 350 in Odisha – organised based on sites and dates taken. In all 23 images from Assam and 18 from Odisha were used, relevant to the narrative (Chapters 5 and 6).

4.3 Role of practitioner in research

Depending upon the aim of the research, the particular roles adopted by researchers vary, which influence the data gathering process (May 1993). As a practitioner undertaking qualitative research, I actively engaged in gathering data, understanding linkages and identifying patterns. I also refer to my experience of working as a humanitarian professional as engaged in reflective practice.

Being a reflective practitioner involves reflection-in-action (thinking what one is doing while one is doing it) and reflection-on-action (where a practitioner reviews their actions subsequently to explain again the understandings in light of the outcomes) (Greenwood 1998). My research adopts the reflecting-on-action approach for professional experiences in Assam and Odisha. I undertook surveys in Assam, and was the team lead – responsible for decision-making – in Puri, Odisha. There were two methodology aspects emerging as a reflective practitioner, related to the fieldwork and its impact on communities. The fieldwork, as described above, included assessments and regular monitoring visits at multiple sites, which were time-intensive and involved many resources. As a practitioner, tools that helped gather quick information to serve programme decisions were used. The extent of community participation during the immediate aftermath of the disaster was limited to consultations with key leaders for identifying beneficiaries and selecting appropriate sites for quick distribution and installation of WaSH facilities. Often, the demands for quick response in various affected villages was high, but there were resource constraints and pre-determined target for beneficiaries. In many cases the actual needs of households were ‘unheard’ in the initial assessments. The programme reporting required collection of gender-disaggregated data, thumb impressions of each recipient, undertaking household damage assessment surveys and a baseline survey. The data gathering for programmes was repetitive given the number of monitoring and donor field visits to same locations, and asking the same questions to communities repeatedly by different visitors led to duplication of information.

Personal factors influence professional experiences, driven by needs, preferences, perceptions, emotions and power and within organisational beliefs (Reeves 1994). There were external factors that influenced programming decisions with budget implications and needed justifications to the senior management and donor approvals based on project requirements, staff welfare and community aspirations.

“It is challenging to work beyond staff's comfort level, logistics' comfort level due to high temperatures and humid conditions near Chilka lake. Team members are spending 8 – 12 hours in the field and 3-4 hours travelling in vehicles and boats. Taking up island villages is

making the work expensive and time consuming. The shelter and PHE activities require considerable back up by the transportation budget.”⁷

This journal entry documents the challenges faced while working in more than 40 degrees Celsius in Odisha. As a practitioner, I was concerned that the high temperatures affected programme outputs, but from the perspective of the communities, this potentially affected their recovery, access to health and other facilities and general well being, aspects that were not directly explored in this research, or within the response programme.

4.3.1 Biases and ethics as researcher

I maintained conscientiousness in data collection through good documentation, being aware of issues, and maintaining traceability of data gathered (de Weerd-Nederhof 2001 p.527). The potential research biases include spatial, project, person, professional and diplomatic biases (Chambers 1983 p.13). As a reflective practitioner, interacting with communities as an agency employee, obviously influences the data gathering and analytical process. Positioning myself as a practitioner researcher, the data gathered in such a way - immersed within the context - maintaining objectivity was challenging. This research acknowledges there were biases in the data collection and analytical strategies, coming from a constructivist stance. For instance, my role as a practitioner has influenced the development of research questions, and set the research objective to address gaps in resilience and recovery theories and WaSH practice. There are personal and professional biases in framing this research beginning with conceptual development and selection of case studies. Representing an agency while undertaking fieldwork influenced the data gathered with individuals, households, and community members. Perhaps, the respondents' and participants' involvement were guided by my position of power within the agency in programme implementation. This close association with the implementing agency also provided insights on organisational mechanisms in learning, participation and integration. This eventually took shape of understanding and reflecting on what external agencies can achieve in terms of behavioural changes within the programme duration. As a practitioner-researcher, my analysis and understanding stems from them the professional and personal concerns I developed during my practice, and through the partnership with Agency A. In this unique position, there are biases of having included the agency project areas,

⁷ Diary entry: Puri, 27th March 2014

and region-specific findings. However, this stems from the research's social constructivist underpinnings. This has allowed me to reflect on practice and understand implications for concepts, theories and agency practice.

This research acknowledges such biases and adheres to ethical principles of doing no harm to research participants, informed consent, and privacy (Bryman 2008 p.118). It followed official (and necessary) procedures as per the Ethical guidelines at the University College London and complying with the Data Protection Act 1998 II. Providing information, gaining informed consent from research participants, and Agency A and other participating organisations were steps undertaken prior to the commencement of the fieldwork. This research was sensitive to the ethical issues of working in a disaster situation. The research participants were disaster-affected, so efforts were taken that their participation did not exacerbate their vulnerability or pose further difficulties (Patel 2011). Considering that the participants had suffered from losses due to disasters, and were in despair, the questions recalling the event and its impacts were limited to the narratives as presented by the participants. They were not probed for further information or details if they did not wish to discuss. This information was gathered through secondary data and key informant interviews, to avoid causing additional emotional distress of reliving the experience of cyclone, floods, losses and deaths. When children were involved during fieldwork, prior permission was sought from their parents or schoolteachers.

Since I belong to the southern part of India, and hail from Mumbai, I was an outsider female researching remote areas in Assam and in Odisha. I gained access through local leaders of self-help groups, youth facilitators and health workers. Being a woman, it was easier to build rapport with women in the rural areas, who discussed freely about private concerns related to menstrual health and security concerns faced while living in camps. The community members were curious and asked about my married status and my caste during the initial rapport building. In order to reflect upon how this influenced data gathering, my impressions, participants' feedback and responses were often recorded in my journal. I found speaking local languages very comforting, which turned the interactions very friendly and engaging for the participants in a less formal manner. The participants might have considered me to be acting on behalf of the NGO, and that I could influence agency decisions for providing community support. This has potentially influenced the participants' responses to my questions during fieldwork.

The household interview data was triangulated with focus groups, and stakeholder interviews. In Odisha, privacy and confidentiality aspects were upheld by anonymising the agencies and participants. In this thesis, names are codified, and the researcher is solely responsible for data analyses at all stages without any involvement of external people. This is done keeping in mind the confidentiality aspects of the organisation, their work and the affected communities involved in the project. When local translators from the NGO were used for the programme purposes, some basic measures were taken to establish rapport building, taking informed consent to use the data to inform the response programme and research project, and address language barriers.

In order to adhere to principles of privacy and confidentiality, this thesis anonymises the data gathered from the two cases. Given the practical challenges, this study endeavoured to maintain ethical considerations including the principles of informed consent and sensitivity in questioning people affected by disasters, together with respect for people's rights to anonymity and privacy (Few et al. 2013 p.49). The humanitarian agencies are referred to as Agency A, B, C, D, E, F and CA, AA in the narrative. The household interviewees were anonymised as A1, A2, and so forth in Assam and O1, O2, O3 and so forth in Odisha. The key informants were categorised and anonymised as LA (Local Agencies), GO (Government Officials), PH (Public health), and Experts.

4.4 Analytical Strategy

The conceptual framework and the research questions guide the analytical strategy. It was challenging to analyse multiple perspectives gained through multi-methods and multi-sited case studies but was managed with the help of a coherent and inductive analytical strategy. The strategy involved prior processing and structuring of gathered data. The data analysis was prompted by LeCompte's (2000) notion of assembling a jigsaw puzzle, through interpretation and understanding of the fragments and of the whole picture. The task of analysis, which makes interpretation possible, requires researchers first to determine how to organise their data and use it to construct an intact portrait of the original phenomenon under study and to tell readers what that portrait means (LeCompte 2000 p.147).

The data gathering produced a large data set, making analysis a long and iterative process (McCracken 1988). There was rich value of the informal data gathered from the field. The following

steps were taken in analysis: map the interview content using mind maps; coding and interpreting the data; identifying themes and organising the data into different categories; analysing the inter-relationships; and cross-site analysis (Miles 1979). I analysed documents, reports, meeting minutes, articles, email records, observations and reflections were compiled in field notes to supplement the data obtained from interviews and PLA tools. This was done by coding, using quotations and memos to record interpretation, factual information, processes and stages in recovery programmes and representing the data in a coherent form to answer the research questions. In the end, there was a complex set of data, as different questions posed to different interviewees based on their role and area of expertise elicited different responses along various tangents. The analysis is iterative, and did not directly compare the responses across different sites. The salience of the theme was considered relevant and important, not how many participants contributed to each theme (Sword-Daniels 2014).

4.4.1 Mind mapping

For transcribing long interview recordings, mind maps were drawn for each interview of phrases and sentences from the recording under various themes and the times were noted (Sample mind map - annexure 10). Mind maps are diagrammatic representations of words, ideas or tasks, arranged around a central theme. Mind mapping is used effectively in management and operations for planning and problem-solving; but there is little literature on its practical and analytical use in academic research (Fearnley 2011). Traditional procedures for data transcription are extremely time-consuming; hence mind maps are used in this research to manage the data and to represent them visually for making connections, interpreting concepts and perceptions. While writing up, important comments or relevant quotes were elaborated through cross-referencing with the taped interviews. Fearnley (2011) found that using mind maps blurred the boundary between transcribing and analysis. It is an untested technique, but she advocates its use for interpretative analysis, requiring a workable combination of researcher creativity and accountability to the data. This research acknowledges that the mind map records less detail than actual transcription; however since I was involved throughout the process of data collection and analysis I could establish the connections between the branches.

4.4.2 Thematic analysis

In this research, the concepts were validated by their presence (or absence) in the interviews, documents and observations, and through constant comparison for similarities, or differences

during coding (Corbin and Strauss 1990). Codes are tags, names or labels; and the process of coding involves tagging, naming and labelling pieces of data to attach meaning, and indexing them for easy retrieval (Punch 2009). Using open coding the data were categorised with descriptive codes (Corbin and Strauss 1990). This generated categories that supported the analysis at different scales following the sub-research questions. Categories were generated manually with the help of memos and inventories of codes and their relationships. Memos were developed to describe and keep track of all categories, and questions during the analytical process. Efforts were made to link the data to WaSH during recovery practices, so the memos directed the analysis towards answering the research question. Similarities as well as contradictions were sought that formed variations within an identified theme. Themes were then related to one another and linked to broader structural conditions that formed their own core category, or were grouped into overarching categories that form the core concepts in the study, such as learning, knowledge, changes and participation. Finally, extensive writing and rewriting of ideas, themes and issues led to establishing the overarching themes that emerged from the data, which go on to form the empirical chapters. There was constant back and forth in narrating events and relationships, or describing the process and interpreting the changes emerging from the data. This shows that data were analysed on an on-going basis, to develop theories inductively (Kawulich 2004).

4.4.3 Context Analysis

The analytical strategy involved understanding of the contextual factors for both case studies. This explored spatial and temporal aspects through contextual analysis, which was helpful to analyse linkages between sequences of events and actions in interpreting changes. The contextual analysis explores the scenario of the households' demographics, needs, access to facilities, and services. This analysis interprets macro (regional, national and international) and meso (state and district) policies impact micro (household, settlement and village) level. Data from secondary sources and primary data were incorporated in the analysis. Thus contextual analysis provides useful insights into the economic and socio-political realities of the communities while discussing recovery processes. It allowed understanding of themes and issues emerging from the empirical research, which were not originally part of the conceptual framework or the focus of this research inquiry.

Chapter 5: Assam Case Study

This chapter presents empirical evidence from Assam to describe the recovery after the 2012 floods (Section 5.1); household WaSH practices (using data from household interviews and observations) (section 5.2); community recovery priorities (using data from change analyses and priority ranking exercises) (section 5.3). It reviews the data from semi-structured interviews and documents to describe local recovery initiatives (section 5.4), government response (section 5.5), and response by Agency A and other humanitarian NGOs (section 5.6).

5.1 Assam floods 2012-13

In 2012, Assam faced consecutive waves of floods from June-October due to breaches in embankments: 43 breaches were reported on the river Brahmaputra and 14 on its tributaries. The first wave of floods affected 2.4 million people in 4,540 villages across 128 revenue circles as shown in Figure 5.1.⁸ By September, newer areas were submerged across 2,174 villages under 77 revenue circles in 18 districts, affecting 20 lakh people.⁹ The floods displaced 543,088 people and caused 126 deaths with 19 reported missing (ASDMA 2012b). In 2013 the floods and erosion recurred, which affected the recovery processes in previously flood-affected areas (Table 5.1).

Table 5. 1: The consecutive flood-waves in 2012 and 2013 (ASDMA 2012b)

2012 Flood waves	Affected Districts
Floods across the state (June - July 2012)	Sonitpur, Nagaon, Morigaon, Lakhimpur, Dhemaji, Dhubri, Barpeta, Nalbari Jorhat, Golaghat, Sibsagar, Dibrugarh, Tinsukia, Kamrup
2nd and 3rd waves	Morigaon, Sonitpur Barpeta, Dhemaji, Kamrup and Sibsagar
Floods and erosion (2013)	Morigaon, Lakhimpur, Dhemaji, Sonitpur

⁸ Administrative unit under the district, comprised of one or more development blocks

⁹ Assam Tribune: News Article, September 27 2012

Assam Study Map

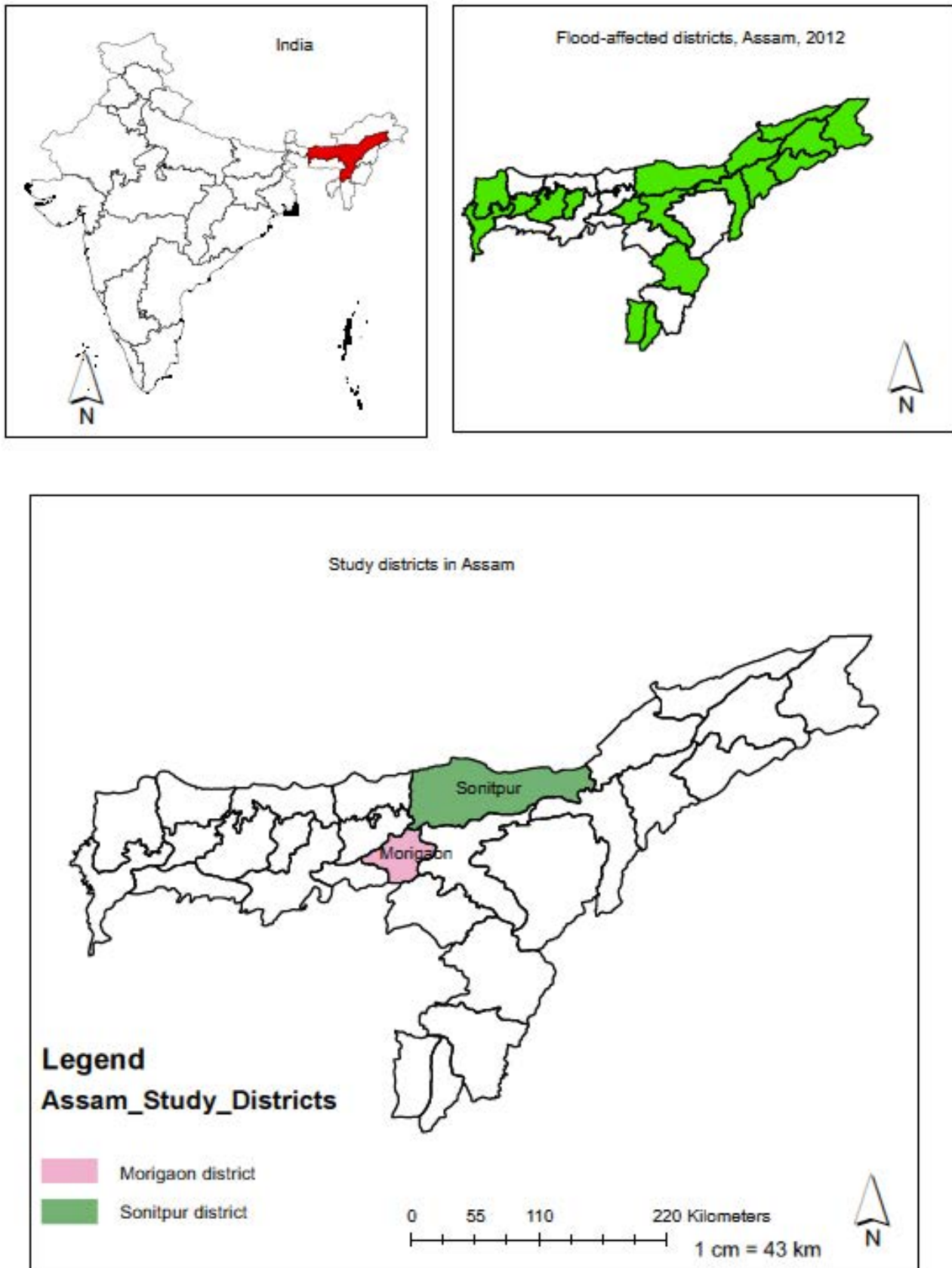


Figure 5. 1: Flood-affected districts in 2012 (Adapted from IFRC, 2012)

Sonitpur and Morigaon faced severe losses as indicated in Table 5.2 (ASDMA 2012a).

Table 5. 2: Disaster damages in Sonitpur and Morigaon districts (Source, ASDMA)

Impacts	Sonitpur	Morigaon
Affected development blocks	3 – Tezpur Sadar, Biswanath and Gohapur	3 – Mayang, Laharighat and Bhurhanda
Total villages affected	251	322
Total area affected	2977.893 hectares	58150 hectares
Loss of crop areas	15935 hectares	39906 hectares
Total livestock lost	4160	400
Total population affected	2,24,579	80,000
Total casualties	6	5
Total displaced population	1,97,986	30,000
Total relief camps	120	258

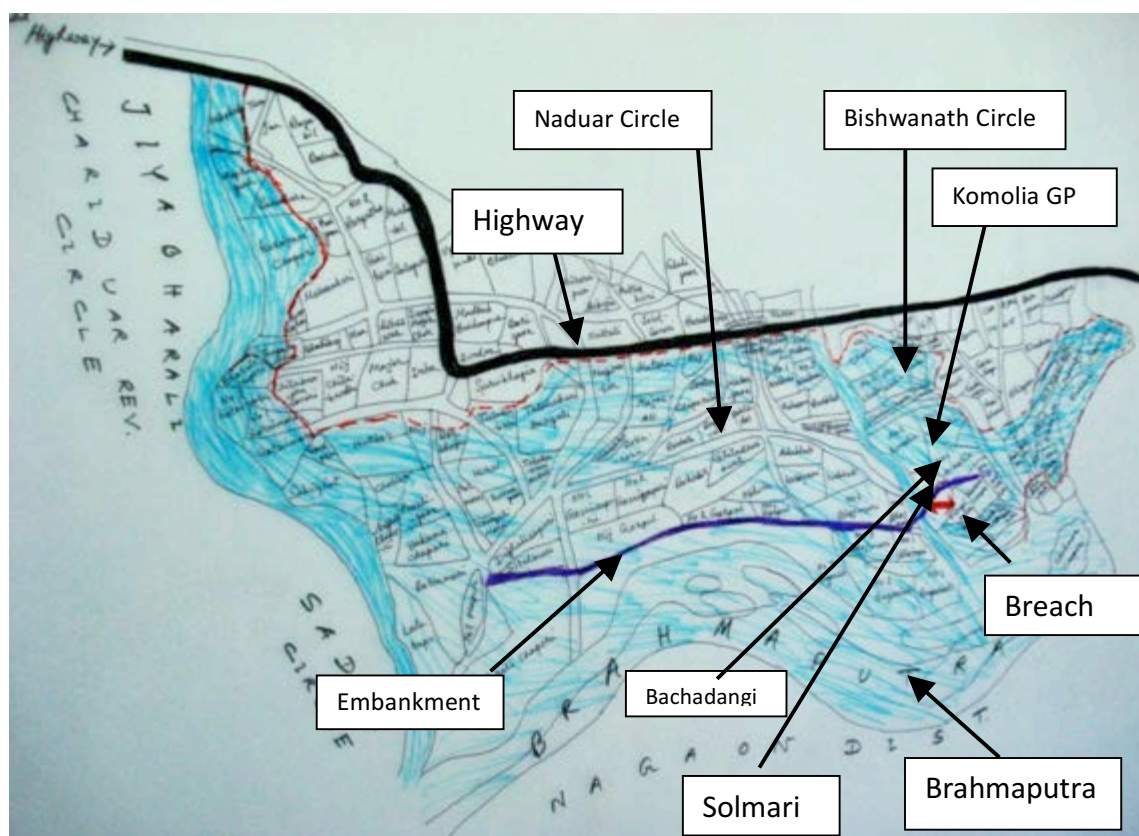


Figure 5. 2: Map of affected area in Biswanath, Sonitpur (Source: Naduar Circle Office, Sonitpur)

The 2012 floods in Sonitpur – the first floods for 12 years in Solmari – occurred due to a breach in the embankment (Figure 5.2). During the 2012 floods in Solmari, the flood waves had devastated the embankment and ravaged the public school building. In 2012, official records show that only 300 families were living in Solmari, which was reduced to 80 families in 2013.¹⁰ However, during the assessment in July 2012, unofficial statistics indicate that 3000 families in the neighbouring villages were displaced – 1400 in Solmari – due to the embankment breach in Solmari. 6500 persons – 2000 women, 3250 men, 1250 children 300 infants and 100 elderly – were living in makeshift camps.¹¹ In Boramari, floods and erosion were a regular phenomenon: floods had occurred in 1942, 1950, 1974, and 1981, and annually from 2006-2013 after construction of the KaliaBhomora Bridge on the Brahmaputra. Boramari was called as *Kacharigaon* (camp settlement) as it hosted displaced families from other flood- and erosion-affected villages in Assam. There were 1215 people in 142 households belonging to the ethnic local communities and Bengali-speaking Muslim migrant families.¹² In July 2012, Agency A launched emergency response in Sonitpur and Morigaon with local NGO partners Agency B and C in the respective districts. The initial support included distribution of food, non-food items (NFIs), and shelter and hygiene items. The WaSH support consisted of construction of emergency latrines and bathing cubicles in camp areas, chlorination of water-sources and hygiene promotion activities.

The European Commission's Humanitarian Affairs and Civil Protection Department (ECHO) announced € 2 million in grants for early recovery. Accordingly, the humanitarian agencies – Agency A, Agency CA and Agency AA – under a consortium for recovery programme titled 'Humanitarian assistance to vulnerable population affected by flood in Assam' were awarded € 900,000 for 6 months. This grant was for undertaking activities such as: installation of hand pumps; construction of flush latrines and bathing cubicles; distribution of chlorine tablets for water purification; provision of hygiene and women's sanitary kits; waste management via cleaning of drainage systems and health education sessions. Agency A continued early recovery efforts in Solmari and Boramari in WaSH, emergency food security and livelihoods (EFSL) and shelter interventions (Section 5.6).

¹⁰ Interview: GO-7, Solmari, 16-09-13

¹¹ Document: Common Damage Assessment Form – Unicef India and RedR India 2012

¹² Interview: GO-8, Morigaon, 19-09-13

5.2 Household WaSH

This section presents the emerging themes from observational data and 18 household interviews over several visits in Solmari and Boramari (highlighted in Figure 5.1). The household practices varied depending on location, prior access and nature of floods, as per the data from the interviews, accounts of events and observational data. These are described under pre-disaster WaSH (recall in interviews and documents), immediate impact on WaSH facilities (transect walks, observations and secondary sources); WaSH situation in relief camps (FGDs with families in these camps); improvements in WaSH situation; and recurring disasters and WaSH (observation and interviews). The information in each scenario is organised under water sources, collection, treatment, defecation practices, bathing, and hygiene practices, menstrual hygiene, school WaSH, roles and responsibilities, technology and accessibility.

5.2.1 Pre-disaster WaSH

The majority of the rural population depended on groundwater for drinking in Assam.¹³ Solmari and Boramari did not have public piped water supply scheme in the vil (PWSS).¹⁴ The WaSH KAP (Knowledge, Attitudes and Practice) baseline survey indicated tubewells were primarily used.¹⁵ It was observed that India Mark 2 and 'Popular 6' handpumps were prominently used. The India Mark II is a human-powered pump designed to lift water from a depth of fifty metres or less; Popular No. 6 Pump is a lever operated suction pump for shallow wells, installed in collapsible tube wells, designed for family use, and serving up to 100 persons. In Sonitpur, the government installed Tara (direct action) handpumps through subsidies to families selected on pre-determined criteria every year.¹⁶ Tara handpumps are designed by UNICEF, for lifting water from borewells with static water level not exceeding 15m; they are more cost-effective than other pumps for medium lifts (upto 15 m) and are safe from bacteriological contamination since all underground parts are made of non-corrosive materials like PVC (poly vinyl chloride) or Stainless Steel. The alternative water sources for the rural households included ponds, rivers and lakes for washing, bathing and cleaning.

¹³ Interview: INGO 4, 2014

¹⁴ Interview PH -2, January 2013

¹⁵ Document: Agency A WaSH KAP survey, 2013

¹⁶ Document: Needs assessment report, 2012



Image 5. 1: Kolshi a traditional pot used for water collection and storage (Image: Solmari, 14-01-13)

There were 15 handpumps in Solmari, used for drinking and cooking purposes, while members depended on river for cleaning and bathing purposes. Primarily, women and young girls were responsible for water collection. On an average, each household required 30 litres per day for 6 members, for various purposes. Women travelled for 30 minutes one-way to collect water in 3-4 round trips daily. The traditional practice was to use local pots called *kolshi* (Image 5.1), or buckets and jerry cans to collect water, and carry 2-3 utensils in each trip.¹⁷

The households did not follow any particular methods for water treatment; alum, a crystalline salt containing aluminium and potassium is widely used in industry as a hardener and purifier. The households used alum to remove solid particles, or boiling and storing in earthen pots for cooling. The households abandoned handpumps if there was any change in colour of water or taste.¹⁸ The access to and availability of water and sanitation facilities was limited and there was no provision for piped water supply scheme (PWSS) in their village. In Solmari, only 500 persons used either public toilets (pit latrines, pour-flush latrines, flushing toilets) or family toilets and shared family toilets (pit latrines, pour-flush latrines, flushing toilets etc.). Although households had constructed

¹⁷ FGD (women): Solmari, January 2013 & Boramari, September 2013

¹⁸ Household Interview: A2, January 2013

private latrines with subsidies from the government, they continued to defecate in the open.¹⁹ Open defecation was still commonly practiced, as households were not aware of how to deal with the faecal waste, once the soak pits filled up.²⁰

5.2.2 Immediate Impact of disaster on WaSH

The flash floods were caused by breach or overtopping of embankments; these destroyed and damaged the WaSH facilities due to the impact of strong water currents. Households were displaced and lived near the embankments. There were limited safe and functional handpumps in the villages in 2012 due to contamination and destruction. Households found it difficult to access WaSH facilities during the multiple flood waves in 2012. All the handpumps were completely destroyed in Solmari due to the floods.²¹



Image 5.2: A women using the floodwaters for household purposes (Image: Sonitpur, 13-07-12)

The floods contaminated open, unprotected water surfaces like ponds and lakes. Existing latrines were covered with debris. The households used contaminated water sources without any

¹⁹ Informal conversation: GO-1, Solmari 18-01-13

²⁰ Document: Agency A WaSH KAP survey, 2013

²¹ Document: Common Damage Assessment Form – Unicef India and RedR India 2012

treatment.²² 25-30 families depended on a single functional water source, causing extensive groundwater depletion.²³ There were only 5 functional handpumps in the village. The average travel distances for collecting water one way and back increased up to 1 km, and time required was almost 60 minutes on foot during floods due to inundation of nearest water sources.²⁴ Women had to queue for longer times (up to an hour) to collect water. They accessed the handpumps by wading through floodwaters, or by boats driven by men; sometimes women used floodwaters for cleaning and washing instead (Image 5.2). The households had also lost their water collection utensils along with other household assets.

The floods, resultant displacement and challenges in accessing WaSH facilities during floods had serious consequences for women's health as illustrated in the following example:

Mrs A1 (35F) from the Bodo tribe in Boramari was pregnant during the 2012 floods, and stayed in a *chang ghar* (house on stilts) with her husband and six children during the monsoon. Lack of food, clean water and adequate sleep resulted in Mrs A1 and her new born, both suffering from anaemia and diarrhoea after the floods. By 2013, A1 had recovered her health through financial support from Agency A.

"I fell ill last year when floods happened and would have lost my baby during the floods due to ill health. I could not reach the hospital when baby was ill – it was all submerged in water. There was no water supply and people defecated in the floodwaters. We learnt later that these pose a huge health risk of diarrhoea, and our children were affected because of this."

25

One of the risky WaSH practices involved consumption of water from the contaminated sources without proper testing or microbiological treatment after the floods. There was no provision for proper drainage, aprons or soak pits leading to further contamination and stagnation as shown in image 5.3. During the floods, people travelled by boats for defecating in floodwaters.²⁶ Mrs A3 (40F), belonging to the Bodo tribe, moved to Boramari eight years ago, when their previous village was

²² Documents: Agency A WaSH assessment report on Assam floods 2012-13

²³ Document: (Unicef India & RedR India 2012) July 2012

²⁴ Document: Common Damage Assessment Form – Unicef India and RedR India 2012

²⁵ Household Interview: A1, Boramari (06-01-13, 13-09-13)

²⁶ Interview: PH – 2, Agency A 29-01-13

engulfed by the Brahmaputra. When the floods occurred in 2012 their homes were submerged, and the household hand pump and latrine were inundated. During the floods the family lived in *chang ghar* for a month till the waters receded. They continued without access to food, safe water, sanitation or bathing. Mrs A3 and her children depended on the men in the family to go on a boat during the floods – for water collection and defecation – in the floodwaters.²⁷



Image 5. 3: Water sources in the villages after the floods in 2012 (Image: Morigaon, 08-01-13)

The households had latrine facilities but did not use them, instead they continued with open defecation. In Solmari, the assessment survey indicated that 1500 adults and 500 children practiced uncontrolled open defecation during the floods, and 3500 adults practiced controlled defecation. After the floods, uncontrolled open defecation was common due to non-availability of public toilets, and functional household latrines.²⁸ As a result, more than 50 households had reportedly suffered from water-borne diseases like diarrhoea, vomiting, stomachaches and infections during the floods.²⁹ Mr A2 (56M) a farmer in Solmari had built a household latrine and bathing unit, which were covered with debris (Image 5.4). Post-floods, the family continued to defecate in the open,

²⁷ Household Interview: A3, Boramari

²⁸ Document: Common Damage Assessment Form – Unicef India and RedR India 2012

²⁹ Document: (Unicef India and RedR India 2012) July 2012

and bathe in the river due to their cultural preferences. They reported feeling uncomfortable while defecating within closed spaces. Women used the latrines during the night or before sunrise.³⁰

5.2.3 WaSH facilities in relief camps

The flood-affected families were evacuated to schools and colleges in the towns. In Solmari 3000 displaced families were living in Biswanath public school, or makeshift camps on the embankments.³¹ These schools were run by district administration as government camps till the floodwaters receded. In the school, approximately 12, 000 people (4500 women, 5000 men, 1200 children, and 80 elderly) were living in the classrooms and passages without adequate arrangements for living and basic facilities.³² The camps were discontinued to allow schools to resume, the families moved to makeshift camps on the embankments, PWD roads or high grounds with no access to drinking water and sanitation.³³

In the makeshift camps individual families lived in tents built with salvaged materials such as plastic sheets or tarpaulins, aluminium/tin sheets and wooden poles.³⁴ In Sonitpur, 500 families were living in makeshift camps on the breached Biswanath-Paanpur embankment (Figure 5.2). There were only five handpumps approximately 15-30 minutes walking distance one way.³⁵ These makeshift camps continued until October 2012, as consecutive flood waves affected Sonitpur and Morigaon. The frequent displacement, living under crowded conditions, open defecation near water sources, consumption of unsafe water without proper containers, or treatment posed a huge risk to health and led to deterioration of living conditions.³⁶ Around 1000 adult members and 400 children were reported to practice open defecation, while 300 adults and 100 children had access to only 8-10 functional toilets.³⁷

³⁰ Household interview: A2, 18-01-13

³¹ Document: (Unicef India & RedR India 2012) July 2012

³² Field notes: July 17th, Sonitpur, 2012

³³ Document: (Unicef India & RedR India 2012) July 2012

³⁴ Field notes: Sonitpur July 2012

³⁵ Field notes: July 2012

³⁶ Document: (Unicef India & RedR India 2012) July 2012

³⁷ Document: Common Damage Assessment Form – Unicef India and RedR India 2012



Image 5. 4: Household latrines with temporary walls (Image: Sonitpur, 11-07-12)



Image 5. 5: Water storage system are locked in school relief camp (Image: Sonitpur, 13-07-12)



Image 5. 6: Flood-affected families living in a school run as relief camp (Image: Sonitpur, 13-07-12)

The existing facilities in schools could not be accessed; they were locked up to prevent camp residents from using these facilities meant for school students and teachers (Images 5.5 and 5.6). “The school management committees are locking handpumps and latrines to prevent us from using. They say it is for the students there, not for the flood-affected populations.”³⁸ Therefore, the affected population in the camps went for open defecation due to lack of latrines in both schools and makeshift camps. In the makeshift camps on the embankment, the local Panchayat and Ward members supported in relief distribution and installed handpumps for temporary water supply (Images 5.7 and 5.8).

Only 10% of the flood-affected and displaced populations received some support by the local leaders: food grains, plastic sheets and mosquito nets. Agency A constructed emergency latrines separate for men and women. In Solmari, they installed four emergency latrines (Image 5.9). In the relief phase, Agency A was responsible for operation and maintenance and encouraged household members to use latrines. The women continued to bathe in the open rivers and lakes and struggled with issues of privacy and security. Those living in the camps bathed near the handpumps.

The school building in Solmari was washed away during the floods in 2012, and this posed particular challenges in hygiene education and access for children to WaSH facilities. In Boramari, the schools resumed once the floodwaters receded. However, the life of adolescent girls in schools was challenging post-floods. Ms A4 (12F) from Solmari (Image 5.10) found it difficult to live a normal life post-floods. She had missed school during the floods because it was washed away during the 2012 floods, and instead went to makeshift school without any facilities. For bathing, she went to the river or nearby pond with her friends, or sister. She was shy to bathe and defecate in the open as passers-by looked. She felt insecure and uncomfortable so she bathed with her clothes on.³⁹

³⁸ Field notes: Camp resident 13-07-12, School/relief camp visit, Biswanath block

³⁹ Informal conversation: A4 Solmari, 23-09013



Image 5. 7: Makeshift shelters in the camp settlements on embankment (Image: Sonitpur, 13-07-12)



Image 5. 8: Installation of handpumps on the embankment (Image: Sonitpur, 13-07-12)



Image 5. 9: Hygiene messages displayed on the emergency latrine near the embankment (Image: Solmari, 05-01-13)



Image 5. 10: A young displaced girl in Solmari uses mirror given by Agency A (Image: Sonitpur, 23-09-13)

Women and adolescent girls reported that they went for open defecation, and were reluctant to discuss menstrual hygiene.⁴⁰ It emerged that they used an old piece of *saree* or any other cloth during their menstruation, washing and reusing the same cloth each time. The women were restricted during ‘those’ days and were prohibited from entering main sections of the house – kitchen, prayer rooms since they were considered impure and polluted during menstruation. The adolescent girls preferred using sanitary napkins, but could not afford them, and were unaware of disposal mechanisms.⁴¹ Initially, the women were unaware of the risks associated with children’s faeces and disposal methods during floods.⁴²

5.2.4 Improved WaSH situation

From 1-6 months following the floods, Agency A interventions restored access to safe water and sanitation in Solmari and Boramari. Village volunteers were trained to repair and chlorinate handpumps.⁴³ Communal handpumps were installed over raised mounds for access during floods (Image 5.11) and pre-existing handpumps along with provision of concrete aprons, construction of drainage channels and soak pits to prevent seepage (Image 5.12).⁴⁴

Agency A provided buckets for collecting and storing water through hygiene kit distribution to each household. The buckets had handles for carrying, lids for preventing contamination during transport and storage, and detachable taps to release water. However, the women complained of backaches and arm sprains while carrying heavy buckets, which they were not used to, so they preferred *kolshi* for water collection, used *sarees* to cover it and as a filter.⁴⁵ Women also preferred using earthen pots, kettles or pitchers for storage.⁴⁶

⁴⁰ FGD (women): Solmari, 13-07-12

⁴¹ FGD: Young girls 16-01-13

⁴² FGD (Women): 17-01-13, Solmari

⁴³ Informal conversation: INGO-10, Morigaon, 04-01-13

⁴⁴ Household Interview: A5, Solmari 28-07-13

⁴⁵ FGD: Women-RTE 14-01-13

⁴⁶ Field notes: 27-08-13, Solmari



Image 5. 11: Newly installed hand pump on a raised platform (Image: Boramari, 09-01-13)



Image 5. 12: Women using a rehabilitated hand pump (Image: Morigaon, 13-09-13)

For water treatment, households received chlorine tablets to purify water during the emergency from Agency A. However, households in Solmari reported reluctance in using these tablets because they disliked the chlorine taste. They did not practice any other water treatment method except boiling – expensive and difficult due to use of cooking fuel or wood, and unfavourable during summer due to the heat – and use of cloth filters. The poor households did not purchase water treatment tablets because they could not afford the water purifier tablets available in the markets.⁴⁷ It emerged that for households availability of water was important than quality of water in Solmari.⁴⁸ Agency A installed four emergency bathing cubicles near the camps in the embankment, with privacy screens for safety and security of women. The women preferred these facilities and found them safe and secure and used them regularly.⁴⁹

When the populations returned to their original villages, the emergency latrines were decommissioned, and materials were handed to the communities for reuse.⁵⁰ For promoting use of latrines and access during future floods, Agency A constructed a communal latrine complex on raised platforms in Solmari and Boramari villages. In December 2012, three new latrines were constructed in Solmari and four in Boramari using corrugated galvanised iron (CGI) sheets. User groups (group of members from neighbouring households that share agency-built water source or latrine) were provided with cleaning materials – *jhadoo* (brooms), harpic (washing liquid), mugs and buckets – for communal use and maintenance of latrines.⁵¹

5.2.5 Recurring disasters' impact on household WaSH systems during relocation

In April 2013, the construction of the new embankment isolated Solmari on the riverside. During the following monsoons, the land and assets were washed away due to erosion. The household investments in handpumps, shelter, latrines and livelihood assets were lost due to recurring floods and erosion forcing all the households in Solmari to abandon their land, shelter, and relocate to safer areas. The households retained the shelter and emergency latrine materials, but WaSH facilities were inadequate in the relocated areas. The fixed WaSH facilities provided during recovery could not be moved while relocating, hence the nature of flooding and erosion in 2013 and the

⁴⁷ Informal conversation: GO4, Solmari 29-09-13

⁴⁸ Household Interview: A5: Solmari 28-07-13

⁴⁹ Field notes: 27-08-13, Solmari

⁵⁰ Informal conversation: INGO-10, Morigaon, 04-01-13

⁵¹ Interview: LA 6 – Sonitpur, September 2013

technology posed a challenge for the household recovery and access to WaSH facilities. In Solmari the 'Popular 6' (P6) handpumps were removed and reinstalled, and 'Mark- II' pumps were abandoned. 18 families living on platform in Solmari depended on one hand pump.⁵² An engineer claimed,

*"The Popular 6 model is much easier to take apart and move and reinstall, whereas the Mark 2 is a heavier model that requires specialised tools and skills to open up and even if you do, one of the vital parts, the suction filter, is at the bottom of the casing which could be anywhere between 100 feet to 300 feet underground - which is a pain to take out."*⁵³

The poor households in Solmari and Boramari living in close proximity to the river were wary of the river's movements during the monsoons. They depended on communal facilities or open water bodies, because installing private handpumps was expensive and entailed additional costs every year for flood-protection – aprons and raised concrete platforms – without receiving damage compensation of 2012 floods.⁵⁴ In 2013, 10 households depended on 4 self-built household latrines, abandoning the communal latrine models. The majority went for open defecation due to lack of adequate latrine facilities, and inability to afford private latrines.⁵⁵ In Boramari, the households were aware of risks involved with open defecation. Some households in Solmari like A6 and A8 rebuilt private latrines when they relocated. They preferred household latrines to shared or communal latrines.

⁵² FGD: Solmari, 28-08-13

⁵³ Informal conversation: Expert – 5 (Public Health Engineer)

⁵⁴ Informal conversation: INGO 10, 04-01-13

⁵⁵ FGD: Boramari, 04-09-13



Image 5. 13: Using nets as a water filter (Image: Morigaon, 14-01-13)

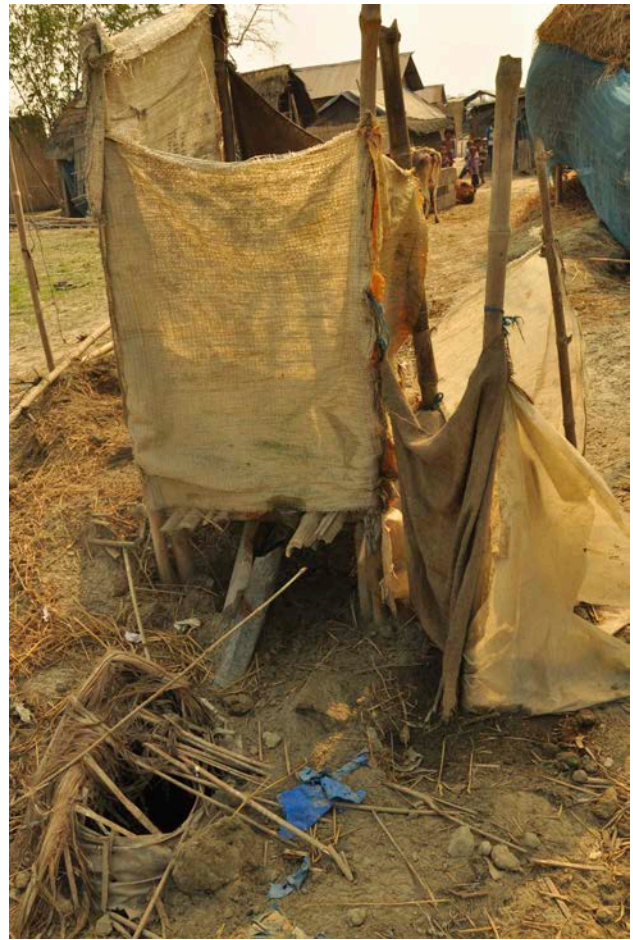


Image 5. 14: Kaccha latrines self-built by households (Image: Morigaon, 04-01-13)

These self-built latrines were constructed with reused plastic sheets (Image 5.14). Household decisions of installing latrines were mutually agreed by the husband and wife. The primitive self-built latrines were dangerous because of the risk of falling and causing injury, and pit spillage. Frequent displacement and losses led to impoverishment and inability to invest in household latrines. The members reported that they defecated in the sugarcane fields, and avoided defecating near water bodies.⁵⁶

Mrs A6 (28F), from Solmari had just about managed to recover from losses due to 2012 floods. Her problems were magnified when her newly built house fell on the wrong side of the new embankment. The family had to abandon their land in Solmari, dismantle the shelter and relocate

⁵⁶ FGD: Boramari, 01-09-13

to a raised mound near the embankment. She rebuilt a private latrine using salvaged materials because she prioritised household latrine and depended on communal handpumps.⁵⁷

In Boramari 10-15 families relied on communal handpumps; and used cloth filters to remove solid particles (Image 5.13).⁵⁸ Mrs A7 (42F), an *Anganwadi* teacher in Boramari, had to relocate her family by herself as her husband had migrated for work. She invested in a household hand pump but continued open defecation. She constructed raised storage units to prevent her documents and essential food grains from getting soaked during floods. She boiled the water before consumption, for good health of her children.

“It is much easier now to manage my household activities, take care of my children and also fulfil work in the Anganwadi because of the hand pump I installed in the household. I still go to the open fields for defecation near the sugarcane plantations, but [am] always scared when someone passes by.”⁵⁹

For bathing the households used water from the communal handpumps and open water sources such as ponds (Image 5.15).



Image 5. 15: Women and children bathing in ponds (Image: Solmari, 28-09-13)

⁵⁷ Household interview: A6 17-09-13

⁵⁸ FGD: Boramari, 04-09-13

⁵⁹ Household Interview: A7, Boramari 04-09-13

Mrs A8 (39F) from Solmari had acquired land when she relocated on the safe side of the embankment in 2013. As there was no external support, they invested in a latrine and hand pump. The cost of bamboo was 500 INR (roughly 5 GBP), plastic sheet for walls cost 200 INR and 400 INR for the labourers (roughly 2 and 4 GBP respectively). They built a latrine using the husband's income earned as a *mistry* (mason); they were aware of the risks associated with open defecation for their children. This Mrs A8 believes inculcates safe hygiene behaviour amongst their children such as hand washing at critical times.⁶⁰

Only a handful of families living near the flood platforms preferred using the communal latrines. In Boramari, Muslim families were denied access to communal latrines and as a protest, they had damaged the door to open toilets. There were tensions between the indigenous tribes (Bodos, Ahoms) and Muslim immigrants. In Solmari and Boramari, the facilities were locked up because public users left the facilities very unclean leaving the neighbouring users to clean and maintain these facilities.⁶¹ In September 2013 in Solmari, the neighbouring houses had locked up the latrines to prevent public use (Image 5.16).⁶²



Image 5. 16: Locked up latrines on the raised platform (Image: Solmari, 28-08-13)

⁶⁰ Household interview: A8, Solmari, 28-09-13

⁶¹ FGD Solmari, 05-09-13

⁶² Household interviews: 28-09-13, Solmari

Due to recurring disasters, households did not invest in permanent and fixed WaSH facilities. They invested least amount of resources in rebuilding their homes and for recovering losses. This enabled them to relocate swiftly when the village gets flooded and eroded. The responsibilities for WaSH recovery and relocation fell upon women, as they were involved in water collection for household consumption, cooking and bathing children. The women-headed households in Solmari and Boramari were responsible for household recovery. A study commissioned by Agency A found that outward migration of the youth for increasing household income resulted in loss of manpower in agriculture and gender imbalances post floods.⁶³ The men and youth migrated for labour work in Karnataka, leaving behind the women for running the households, fulfilling childcare responsibilities, and earning additional income through livestock rearing, labour work or producing local liquor. However, women did not take decisions on recovery investments because men controlled the finances and remittance money. In Solmari, women were illiterate and therefore lacked understanding of technical aspects of WaSH facilities – minor fixing and repairing of handpumps, and access to local mobile solutions for latrine construction.⁶⁴

The elderly groups provided enriching perspectives on flood history, WaSH practices and attitudes. In Boramari, they explained that floods in Morigaon became regular after the construction of KaliaBhomora Bridge, Tezpur, which altered the river course and caused more floods in Morigaon. This resulted in fluctuating floods all over the plains. An elderly member from Boramari commented,

*‘Since 2007, humanitarian and local NGOs have supported us – constructing raised platforms, raised houses, raised handpumps and latrines – unfortunately these were lost again and again to floods. However, the knowledge and skills remains with us and we use them once the floods are over’.*⁶⁵

Although PHP activities, monitoring changes and use of facilities can lead to change, sustaining changes over long-term when there are no floods is challenging, unless attitudes of this generation was changed through willingness, knowledge transfer and technical solutions.⁶⁶

⁶³ Document: Agency A Post-Disaster recovery Needs Assessment, February 2013

⁶⁴ Interview: LA-6, Sonitpur

⁶⁵ Household interview: A9, Boramari 24-09-13

⁶⁶ FGD: elderly members Boramari 18-10-13

The floods had considerable impacts on schools, and children's health and hygiene practices. During FGDs with children in Solmari, they demonstrated their awareness of hygiene practices and understanding of the importance of toilets. Since there were no toilets available in the school, they practiced open defecation. In a village mapping exercise, children highlighted defecation areas in yellow and flooded areas in blue, indicating that the same areas where people defecate were being flooded. They aspired for the new school in Solmari with modern facilities for drinking water, toilets and for playing.⁶⁷ The generational gap amongst children and elderly was evident in their implementation of safe practices: elderly realise importance but do not change their behaviour, while children learn and are eager to adopt safe practices but lack access to facilities.

5.3 Community Post-Disaster Recovery

This section discusses the changes at the community level, gathered using participatory change analyses formats; and community priorities using data from priority ranking exercises (see section 4.2.1).

5.3.1 Changes at the community level

The flood-affected communities in Solmari demanded for new embankment for resilience against floods in January 2013.⁶⁸ In Solmari and Boramari new embankments were constructed in May 2013, which forced all households to vacate their land as it fell on the wrong side of the embankment. In Morigaon, the embankment had breached in the 2008 floods, and again in 2012, followed by a breach of the new embankment in 2013: the same year it was built. Thus embankments failed as flood-prevention measures for the study villages: the frequent breaches and ad hoc manner of construction compounded community recovery by marginalising community sections and forcing them to relocate. It also influenced agency programming strategies and interventions, as Agency A withdrew its operations from Solmari when the new embankment was constructed. There were mixed reactions from the communities regarding the embankments. One of the youth in Solmari claimed,

⁶⁷ FGD: Children, Solmari 16-10-13

⁶⁸ FGD (men): Solmari, 28-01-13

“In my lifetime itself I have seen three embankments being washed away, don’t know how many my father and grandfathers have seen. The last one lasted for two years and one before that for 5 years.”⁶⁹

The elders in Solmari village recollect that more than nine embankments must have been washed away in the history of the region, due to non-maintenance and floods. The local masons in Solmari village felt the need to use modern technologies used in Majuli island, Jorhat. Despite requesting the local Panchayat and ward members to look into permanent protection measures in the region, these issues have not been addressed. There is a strong demand for scientific protection measures to prevent damages and destruction, and importantly loss of land due to floods and erosion in the future.⁷⁰

The Muslim settlers who struggle with land entitlements and rightful settlements often occupy and cultivate in *char* areas or *chaporis* (unstable and temporary land formations in the river).⁷¹ The local indigenous tribes and Assamese people refrain from living in *char* areas and are not able to cope with the fast-paced erosion observed in many areas in Assam. The Bangladeshi settlers thrive in such conditions as they have adapted to the vagaries of recurrent floods in their country and have developed strategies and mechanisms to occupy the shifting islands.⁷²

⁶⁹ Household interview: A10 Solmari 12-08-13

⁷⁰ FGD (men): Solmari– 14-10-13

⁷¹ These chars are formed when a fertile patch of land is generated within the river when land is lost in the main village. In the lower reaches of the Brahmaputra valley, the sand deposition takes place at a larger extent. Thus the widening of the river morphology leads to the ‘chars’ or ‘saporis’ that are fertile ground for farming, grazing and setting up temporary shelters with dismally no basic amenities.

⁷² Focus group discussions: Morigaon 03-08-13



Image 5. 17: Community built access roads during recovery (Image: Boramari, 29-01-13)



Image 5. 18: The above access road destroyed in 2013 floods (Image: Boramari, 04-09-13)

The recurring floods in 2013 led to land loss and population displacement in Boramari as the river was now flowing where the original village once stood (Images 5.17 and 5.18).⁷³ The community groups in Boramari relocated for survival. An Agency A official explained that:

“People of Morigaon are actually resilient, but their resilience will never allow them to go past subsistence levels. Their resilience is about mobility actually. You have to look at mobility aspects because these families are landless, they are moving from place to place. [...] They are still able to use land during the winter season for multiple cropping – rice, mustard, jute and sugarcane. People are resilient because they have adopted multiple strategies to survive, such as fishery, rabi crops [...] Their ability to cope with stress for very long periods of time does have an effect on their health, their nutritional status, but still they are able to withstand that stress which in most cases communities can’t do.”⁷⁴

Mobility and relocation as a strategy works for some aspects of resilience but creates specific problems with respect to expensive and fixed WaSH facilities. The participatory change analyses aided in understanding how regular disasters and frequent displacement led to resource deprivation and poverty over time. The changes in water, sanitation, hygiene practices, housing and livelihoods in Sonitpur and Morigaon from pre-disaster to until a year after when the floods recurred over four time periods are listed below and summarised in Table 5.3:

1. t-1 Prior to the floods – pre-2012 situation
2. t-2 Emergency phase during the recurring floods in 2012
3. t-3 Early recovery phase when the visit was undertaken in early 2013
4. t-4 Longer-term recovery phase when the floods recurred in 2013

⁷³ Field notes: Solmari, 18-09-13 and Boramari 04-09-13

⁷⁴ Interview: INGO- 3, 18-11-13

Table 5. 3: Changes in water and sanitation at community level⁷⁵

Aspects	Before (t-1)	Emergency (t-2)	Early recovery (t-3)	Recurrence (t-4)
Drinking water sources	Private hand pumps	Open water sources – rivers or lakes	Emergency hand pumps by agencies	1-3 Communal hand pumps
Water handling (collection and storage)	Separate utensils <i>kolshi</i> for collection and storage	Lost all utensils	Buckets provided by NGO, keep containers covered	<i>Kolshi</i> , keep containers covered
Water treatment	No treatment	Govt mechanics and NGO volunteers chlorinated	NGO provided halogen tablets	No treatment, sometimes filter or boil
Sanitation	Open defecation – Solmari Private latrines – Morigaon	Emergency latrines	Communal latrines	Open defecation, some use private latrines
Handwashing after defecation, before eating, feeding children, and cooking	Irregularly (with ash after defecation, with water before eating, not before feeding or cooking)	Not done in camps, used soap after kit distribution regularly	Some could afford to buy soaps, others did not continue with the practice of using soap, but used ash/soil	Only water, ash after defecation
Bathing	Private facilities	River or flood waters, later bathing cubicles	River	River/communal handpumps

These changes replicate the recovery patterns observed in WaSH and housing practices at the household level (Section 5.2). The differential access to WaSH facilities depended on learning, social capital and knowledge, which varied across the geographic locations (in Solmari and Boramari, in the relief camps or makeshift settlements, or the proximity to the river and the embankments). There were changes in access to drinking water sources, and usage in the community groups. The transition from private individual handpumps before disasters to using open water sources during the floods to using communal handpumps after external interventions was documented. During relocation in 2013, the pre-installed facilities were either abandoned or washed away due to erosion. A notable shift in practices emerged from the fact that community groups did not rely on floodwaters or open sources for drinking during floods; instead they relied on friends or neighbours or communal sources due to awareness of risks associated with consumption of contaminated

⁷⁵ Change analyses exercise: Solmari 14-10-13 and Boramari 18-10-13

water.⁷⁶ Prior to the floods, the communities did not follow any techniques for water treatment.⁷⁷ FGD participants reported that Agency A promoted treatment measures such as chlorination of handpumps, or using chlorine tablets at point of use, but communities did not practice these due to concerns of taste, cost of tablets, and lack of knowledge on how to use them.⁷⁸ The preferred methods were boiling or filtration or use of cloth filters or *jhalis* (nets) to remove sediments from the water.⁷⁹

In Solmari and Boramari, the communities had different attitudes towards sanitation despite increased knowledge about the risks associated with open defecation. In Solmari, the groups lacked eagerness to install their own latrines due to economic conditions, whereas in Boramari there was a strong demand for latrines during the 2013 floods.⁸⁰ The difference in attitudes between the two communities could be attributed to the hazard history, prior NGO activities, cultural differences, collective memory and economic constraints due to resource-deprived conditions.⁸¹ With material and technical support from external agencies to improve their sanitary conditions, Agency A reported an increase in emergency and communal latrine usage.⁸² The FGD participants indicated changes in hygiene practices depending on cultural attitudes, and the affordability and feasibility of practices. Muslim communities observed the religious practice of maintaining cleanliness while observing their daily ablutions and prayers, but were less eager to wash hands post-defecation.⁸³ Since soap was unaffordable, communities washed hands with soil, or ash after defecation. Availability of water during defecation was important for anal-cleansing and washing hands and feet.⁸⁴

⁷⁶ FGD (Women): Solmari 28-07-13 and Boramari 04-09-13

⁷⁷ FGD: Solmari 17-07-13

⁷⁸ FGD (women): Solmari, 28-09-13.

⁷⁹ Field notes: Solmari, 29-07-13

⁸⁰ Change analyses exercise: Solmari 14-10-13 and Boramari 18-10-13

⁸¹ Interview: LA 1: Boramari, Agency B

⁸² Document: Agency A KAP Analysis report, February 2013

⁸³ Household Interview: Ms Khatum, Solmari, 28-09-13

⁸⁴ FGD (men): Solmari, 28-01-13



Image 5. 19: Intermediate mobile shelters constructed by Agency A (Image: Solmari, 15-01-13)



Image 5. 20: Shelters constructed on raised plinth (Image: Boramari, 29-01-13)



Image 5. 21: Self-built extensions for the shelters (Image: Boramari, 29-01-13)

The frequent displacement and relocation resulted in communities building mobile houses in Solmari and Boramari. In Solmari 100% houses were destroyed during the 2012 floods. Although temporary shelters were immediately set up, intermediate shelters were provided by Agency A – made of timber, jute mats, bamboo, CGI sheets (either provided by Agency A or salvaged from ruins). This enabled faster dismantling while relocation during repeated floods. Communities also built *chang ghars* (houses on stilts) for living during floods.

Agency A built the intermediate shelters on a raised mud plinth using local materials (see images 5.19 and 5.20). The house owners extended the house to include space for kitchen and cattle-shed (see image 5.21). During the relocation after the 2013 floods, communities depended on their neighbours and families for support to dismantle the shelters and reuse the materials to rebuild in safer areas. This was cheaper than concrete houses that were washed away during erosion.⁸⁵

5.3.2 Community priorities for recovery

During priority ranking exercises in Solmari and Boramari, the community groups came up with the following issues (table 5.4).⁸⁶

Table 5. 4: Community priorities in Solmari and Boramari, 2013

Priority issues	Solmari	Boramari
1	Safe shelter	Water sources, buckets
2	Safe land for housing and agriculture	Food supply/ration
3	Latrines	Tarpaulin sheets for shelter
4	Adequate water sources	Latrines
5	Electricity, protection from river	Protection from river and erosion

The priorities reported by the participants in FGDs evolved in the post-disaster phase. Priorities varied across Solmari and Boramari depending on the recurrence of floods, impact of erosion and household's economic means for recovery. In Solmari, where floods occurred after 12 years, the community participants prioritised safe shelter and protection from floods. Contrastingly in Morigaon, where floods occurred annually, community participants prioritised essential facilities such as drinking water, food and sanitation, during the exercise in 2013. There were mixed reactions

⁸⁵ Household Interview: A10, Solmari, 28-01-13

⁸⁶ Ranking exercise: Solmari 14-10-13, Boramari 18-10-13

regarding the protection provided by embankments in Solmari: in January 2013, prior to its construction FGD participants considered that an embankment would protect their homes and villages from future floods. However, in July 2013 the participants were clear that the embankments had failed to protect from floods and limit the extent of erosion in the villages. They were forcefully displaced because their houses fell on the wrong side of the embankment and recurring floods and erosion had washed away their homesteads and croplands.

There were differences in the priorities reported by men, women and children. In both Solmari and Boramari, men prioritised tangible and productive assets – shelter and livelihoods and secure land tenure – that contributed towards a secure future. Women were concerned about issues of day-to-day access to drinking water, secure sanitation facilities and personal needs such as menstrual hygiene and household assets. However, they prioritised household needs instead of personal needs for recovery. Whereas child participants in Solmari prioritised secure school building because after their school was washed away in the 2012 floods regular classes were held in make-shift camps. The children listed other priorities such as books to study, spaces to play sports and games and urinals and latrine facilities in the school. In Boramari, land was susceptible to erosion, and land prices were increasing, so participants listed essential facilities support for drinking water, food and sanitation. Communities who suffered from floods for the first time prioritised embankment protection and productive assets, while those suffering frequent flood and erosion prioritised restoration of basic facilities.⁸⁷ Water supply was prioritised over owning toilets, and adequate quantity of water was more important than safe water quality.⁸⁸

As is obvious, the agencies' understanding and priorities for recovery were different from those of communities. This was based on what they considered or perceived essential for achieving community resilience to disasters.⁸⁹ For the government agencies focus was immediate relief provision, restoration of damaged infrastructure and facilities and embankment construction for flood protection. For the humanitarian agencies recovery programmes consisted of standardised food and non-food items distribution, livelihood support, WaSH and shelter interventions to

⁸⁷ FGD: Mixed, Solmari, 14-10-13

⁸⁸ FGD: Mixed, Boramari, 18-10-13.

⁸⁹ Interview: INGO- 3, 18-11-13

facilitate early recovery at household and community level. Agency A officials considered that building of embankments will reduce the flood risks faced by the villagers.

“In Sonitpur we (Agency A) had gone in for the first time because of the breach in embankment. This is what the district administration told us. Sonitpur was not a regularly flooded area. We intervened there when there was a breach in the embankment and flood after 12 years, so we did a humanitarian response. Simultaneously we got assurance by the government that the embankment will be repaired. Once the breach is fixed, the people or area that was affected by the floods would more or less go back to normalcy; because that particular embankment was affected only due to the floods.”⁹⁰

The different perspectives on what was essential to recovery impacted the recovery processes and community resilience. In Morigaon, the new embankment constructed in April 2013, breached when the floods recurred in October 2013, leading to further displacement of the communities due to erosion. Since their basic needs for food, water supply and sanitation were unaddressed by the government and humanitarian agencies, the FGD participants prioritised food, WaSH, livelihoods and secure housing support.

5.4 Local institutions in Assam

In this section, the local recovery efforts are presented using data from secondary sources, interviews and meetings with local actors. It emerged that local schools and *anganwadis* advocated safe WaSH practices.⁹¹ The provision of WaSH facilities in schools along with inculcating safe practices and awareness of latrine usage, handwashing and personal cleanliness amongst students was a primary responsibility of teachers. The local government actors such as ward members and *Gaon Panchayat* President were involved in relief provision, damage assessment, compensation, and provision of subsidies in housing, water and sanitation schemes.⁹² The local Panchayat supported Water Resources Department (WRD) and District Rural Development Authority (DRDA) for construction of embankment in Sonitpur and Morigaon under the Land Acquisition Act (1894)

⁹⁰ Interview: INGO- 3, 18-11-13

⁹¹ Actor Mapping Exercise: Solmari, 16-10-13, Boramari: 18-10-13

⁹² Circle office, under revenue office is mandated with relief under the development block.

and provided employment under the MGNREGA scheme.⁹³ The Land Act has come under criticism for forcibly acquiring land for development purposes and causing displacement by paying nominal land acquisition fees to the households (Chidambaram 2015).⁹⁴

Agency A recruited local community youth members through local NGO partners (Agency B in Morigaon and C in Sonitpur) for the response programme. They were involved in supporting emergency relief distribution, conducting household surveys and monitoring visits, hygiene promotion, monitoring and supervising construction activities at the village level and community mobilisation.⁹⁵ However, facilitators and NGO partnerships functioned only during the programme – once the programme ended the local facilitators did not function in the project locations. The local capacities and activities lacked appropriate skills for community mobilisation and for advocacy with government for long-term solutions and disaster preparedness.⁹⁶ Similarly, the CBOs such as Masons' Associations, WaSH committees and user groups, disaster relief task forces and village development committees were involved and trained only during the programme. They had no formalised role in WaSH during recovery beyond the programme's duration.⁹⁷ Agency A had provided training in resilient construction practices for the community members.⁹⁸ The grassroots organisations lacked financial resources, technical expertise and scientific solutions to deal with the localised issues in fund-raising and community mobilisation.⁹⁹ The village disaster preparedness task forces (TFs) faced challenges of frequent displacement, loss of facilities and investments, and lack of inputs such as boats, seeds and livelihood support.¹⁰⁰ These challenges affected their structure and functions once the programme ended. The CSOs in Assam engaged in larger macro-issues and were not directly engaged in WaSH and challenges of recovery from recurring floods.

The types of local actors, their roles and activities and challenges faced by them are summarised in Table 5.5.

⁹³ Informal conversation: GO1, Solmari 18-01-13 and Interview: GO-3, Sonitpur

⁹⁴ Interview: INGO-10, Agency A

⁹⁵ Interview: PH – 2, January 2013

⁹⁶ Interview: LA-6 30-08-13

⁹⁷ FGD (Men): Solmari, 14-10-13

⁹⁸ Informal conversation – INGO-10

⁹⁹ Informal conversation – LA-7, Morigaon 18-10-13

¹⁰⁰ Interview – Expert-1, 04-10-13

Table 5. 5: Local actors' response in Assam and role for long-term recovery

No	Categories	Type	Actors involved	Activities	Challenges
1	Local service providers	Health	ASHA, ANM, midwives	<ul style="list-style-type: none"> - Provide hygiene information through leaflets - House-to-house visits during immunisation 	<ul style="list-style-type: none"> - Limited human resources - Difficulties in outreach activities during floods
		Education service providers	School and <i>Anganwadi</i> teachers	<ul style="list-style-type: none"> - Personal hygiene, and environmental cleanliness - Observe and disseminate awareness of handwashing, nail cutting, use latrines 	<ul style="list-style-type: none"> - Limited resources - Expertise and skills for hygiene promotion during emergencies - Affected by floods
2	Local actors	Government bodies	Circle office, line departments and other relevant agencies, the Panchayat	<ul style="list-style-type: none"> - Relief provision, - Damage assessment and compensation with the district administration - Subsidies for housing, handpumps and latrines and Land for embankments 	<ul style="list-style-type: none"> - Limited role and mandate for recovery solutions - Lack of coordination and guidelines for recovery between line departments - Funding delays for restoration and limited resources for recovery
		Youth facilitators	Agency –recruited staff	<ul style="list-style-type: none"> - Trained for programme implementation - Relief distribution and Hygiene promotion, - Household surveys and monitoring - Construction and Facilitation skills 	<ul style="list-style-type: none"> - Limited role within programme - Organised for programme purposes - Time bound presence
3	Community groups	Community-Based Organisations	Masons' Associations, WaSH committees, task forces	<ul style="list-style-type: none"> - Training in DRR construction techniques - Replicate in housing practices - Flood protection measures - Village disaster preparedness task forces (TFs) 	<ul style="list-style-type: none"> - Lack of self-organising capabilities and resources - Difficulties during relocation - Lack of political support in resettlement, and access to services, land ownership - Presence limited to programme duration
4	Civil Society Organisations		All Assam Students' Union, Kisan Mukti Sangram Samiti (Farmers' Groups)	Advocacy on issues: <ul style="list-style-type: none"> - Displacement by dams, - Scientific measures for Brahmaputra, - Political and ethnic movements 	<ul style="list-style-type: none"> - Limited by their role in recovery in WaSH systems - Political support and expertise in recovery - Centre-State relations determine funding and development programmes in Assam
5	Local NGOs	Development and humanitarian	Agency B and C Other NGOs	<ul style="list-style-type: none"> - Humanitarian objectives and relief distribution - Partnerships and networks for response 	<ul style="list-style-type: none"> - Funding for longer-term recovery programmes - Expertise and mandate for WaSH and resilience programming

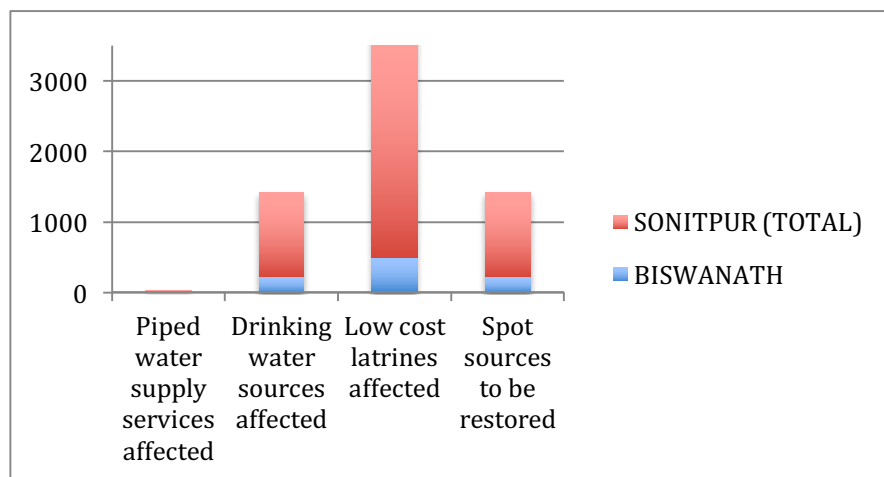
5.5 Government Agencies' response

5.5.1 WaSH response

Guided by the Assam Relief Manual (1976), the Public Health Engineering Department (PHED) took the following actions to prevent disease outbreaks after floods.¹⁰¹

“The flood situation in Assam starts with June and continues till October in 3-4 phases. The low-lying places get submerged, and water-borne diseases spread after floodwaters recede. We take extra precautions for drinking water restoration by rigorous disinfection as per procedures for ring-wells, handpumps in all the affected villages by our trained staff.”¹⁰²

In June 2012, the PHED in the districts undertook damage assessments: in Sonitpur, 3345 latrines and 34 water facilities were damaged (Figure 5.3).¹⁰³ The PHED repaired 239 handpumps and disinfected 1632 Spot Sources along with water sample tests and distributed 26542 chemical packets and 1,55,000 halogen tablets for water purification.¹⁰⁴ In Morigaon, PHED stationed 5 tankers with Reverse Osmosis (RO) treatment systems for mobile water treatment.¹⁰⁵



¹⁰¹ Assam Relief Manual prepared in 1976, is an integrated plan for relief administration for speed coordination and effective control

¹⁰² Interview: GO-5, Morigaon 18-09-13

¹⁰³ Meeting notes: GO-12, Sonitpur 12-07-12

¹⁰⁴ Meeting notes: GO-12, Sonitpur 12-07-12

¹⁰⁵ Interview: GO-5, Morigaon 18-09-13

Figure 5. 3: Impact of floods on WaSH facilities (Source: PHED, Sonitpur 2012)

However these sporadic post-disaster measures were inadequate to counter recurring floods and overlooked the remote villages. The development schemes were not functional: in Solmari no subsidies were provided after the 2012 floods for household latrines under the Total Sanitation Campaign (TSC).¹⁰⁶ The progress rates in rural water supply and latrine was low, and did not feature in the recovery plans.

The immediate government action focused on damage assessment, water supply and treatment, but ignored remote areas, sanitation subsidies and damage compensation. Government officials claimed that situation was under their control and they were prepared for floods because floods are a regular phenomenon in the state.¹⁰⁷ The district administrations ignored the humanitarian situation in the flooded villages after people left the relief camps.¹⁰⁸ Assam Chief Minister had announced an ex gratia amount of INR 1 lakh (roughly GBP 1000) each to the next of kin of those killed due to floods. The line departments submitted district-wise damage estimates and proposals to the Revenue and Disaster Management (RDM) department. The RDM made budgetary relief and rehabilitation allotments under the state annual plans.¹⁰⁹

“We gave pictures and names of houses destroyed; government announced they will give INR 15000 [150 GBP] for each house completely damaged, but no idea when this will happen.”¹¹⁰

The affected households had not received household damage compensation money even two years after the floods in 2012.¹¹¹ The household damage assessment data classified affected houses as partially, severely or completely damaged (Table 5.6 and Annexure 11).¹¹² The damages were assessed for *kaccha* (temporary and non-concrete) houses and *pukka* (permanent and concrete) houses eligible for monetary compensation.

¹⁰⁶ Informal conversation: GO1, Solmari 18-01-13

¹⁰⁷ Meeting: GO-6 Government official

¹⁰⁸ Meeting: INGO-10: Agency A 18-07-12

¹⁰⁹ Interview: GO-2

¹¹⁰ Informal conversation: GO1, Solmari 18-01-13

¹¹¹ Meeting: GO-3 – Government official – October 2013

¹¹² Document: Biswanath Revenue Circle Household Assessment Data (Annexure 11)

Table 5. 6: Monetary compensation to damaged households in Sonitpur, Assam 2012 (Source: Biswanath Circle office, 2012)

Damaged structures	Fully damaged (INR)	Severely damaged (INR)	Partially damaged (INR)
<i>Kaccha</i> houses	35,000	6300	1900
<i>Pukka</i> houses	15000	3200	1900
Huts	2500		
Cattle sheds	1250		

5.5.2 Longer-term recovery measures

GoA focused its long-term flood protection measures on embankment construction, restoration and rehabilitation of infrastructure, preparedness and mitigation initiatives. As a preparedness measure, the PHED focused its pre-disaster efforts on training and hygiene awareness campaigns. The *mistrys* (masons) and field Level *Khalashis* (mechanics) were given training for repairing WaSH systems, and disinfection.¹¹³ PHED undertook rainwater-harvesting systems in schools, PRI buildings and block offices. The hygiene awareness programmes focused on changing people's habits of water handling to prevent contamination of water during floods.¹¹⁴ For resilience against floods, PHED promotes construction of aprons around the water sources to prevent contamination through seepage, and proper drainage systems to take used water far from the water source.¹¹⁵

There were different departments and authorities undertaking various related projects for longer-term development. The Assam State Disaster Management Authority (ASDMA) was mandated with preparedness and coordination, while the Revenue and DM Department was responsible for recovery and rehabilitation. At the district-level, coordination mechanisms are initiated by District Disaster Management Authorities (DDMAs) within line departments and local NGOs under district disaster management plans (DDMPs).¹¹⁶ DM authorities have

¹¹³ Document – Morigaon disaster preparedness note Agency A, May 2012

¹¹⁴ Interview – GO-5, Morigaon 18-09-13

¹¹⁵ Interview – GO-5, Morigaon 18-09-13

¹¹⁶ Meeting: GO-11 – Morigaon 17-09-13

limited authority and mandate for recovery. Emphasising preparedness, an ASDMA official stated,

“We have to understand that relief, recovery and rehabilitation are important parts, and visible part of DM, therefore NGOs or agencies are more interested in these because that is visible. However to break the disaster-poverty cycle we have to focus on preparedness, building capacities, and early warning systems.”¹¹⁷

Flood management involved other departments in the state. Central government assistance of INR 744.90 crores was provided to the State Government for a Flood Management Programme to build 100 flood and anti-erosion projects; additionally INR 2.51 crores were released in 2013 for flood control (GoI 2013). The WRD in Assam undertook embankment and flood walls repair and construction, river training and bank protection measures, anti-erosion and town protection works, river channelization, drainage improvement and sluices, raised platforms, flood forecasting, warning and flood zoning.¹¹⁸ DRDA implemented the construction works under the MG-NREGS for providing rural employment for households with job cards.¹¹⁹

There have been state-level consultations for solutions on river management; and newer technologies in embankment construction have been proposed. An ongoing project funded by the Asian Development Bank and implemented by the Flood and River Erosion Management Agency of Assam (FREMAA) within the WRD has proposed riverbank protection through the construction of ‘geo-tube’ embankments, using textile bags to protect the structure of the embankment from erosion. The projects face opposition from local communities as they have to give up their fertile lands, forcefully relocate to other areas without resettlement support. Although the project claims that participatory discussions were held and NGOs were engaged, the delineation of the embankment was found to be a top-down measure, with limited, if any, consultations at community level.¹²⁰ This is the case even in other areas in Assam facing regular erosion and floods (Lahiri and Borgohain 2011;

¹¹⁷ Interview: GO-2

¹¹⁸ Web link: <http://online.assam.gov.in/web/water/home>

¹¹⁹ FGD (men): Solmari 18-08-13

¹²⁰ FGD (Men): Solmari, 14-10-13

Das et al. 2009; Baruah 2012; Hazarika 2006). The effectiveness of embankments was limited by poor design overlooking local drainage, insufficient maintenance, failure due to river erosion, and limited local participation.

The resettlement of riverine households is a challenge in terms of policy decisions, livelihoods and land issues. The plain areas are flood-prone, while highlands fall within protected areas under forest cover or are privately owned as commercial tea estates.¹²¹ Further, the general preference of the riverine people, who depend on the rivers for agriculture and fishing for subsistence, is to continue living with risks. Another issue plaguing the riverine populations of Assam is the mega-scale hydro-electric dams proposed by central government in the upper reaches of the Brahmaputra and its tributaries in the neighbouring state of Arunachal Pradesh (Baruah 2012). There are issues related to the downstream impacts of the projects and seismic risk due to the construction of 168 hydro-electric projects on the Brahmaputra and its tributaries (Baruah 2012). The resultant changing nature and intensity of floods is alarming the scientists and policy-makers but limited action is being taken for want of appropriate solutions. Further, the humanitarian situation is aggravated each year due to the recurrence of floods.

¹²¹ Informal conversation: INGO 10, 04-01-13

5.6 Humanitarian Agencies' response

This section describes Assam Flood Response Programme (AFRP) implemented by Agency A with funding from ECHO: the programming processes and approaches, institutional capacities and consortium-based support. Agency A's programme included WaSH, shelter and livelihoods implemented over two phases: the immediate emergency response (July 2012 – September 2012, 3 months) and the early recovery programme (October 2012 – May 2013, 6 months).

5.6.1 Agency A WaSH Response Programme

The WaSH interventions consisted of hardware (Public Health Engineering: PHE) and software (Public Health Promotion: HP).

"[Agency A] invests in hardware support to build resilience – such as structural and public health engineering and also supports software. There we definitely see benefits from these interventions in locations where we have implemented because [post-floods] WaSH and the risk reduction models are directly related."¹²²

In the emergency phase, the PHE interventions consisted of emergency water supply, chlorination of water sources and other treatment measures, provision of emergency latrines and construction of bathing cubicles.¹²³ Under the early recovery programme in Assam, communal facilities were installed on raised mounds for access during floods. These included raised handpumps and separate latrine complexes for men and women. The existing handpumps in the villages were rehabilitated with concrete aprons, raised platforms and drainage. Open water sources like wells, ponds and drains were chlorinated under the programme, as the community groups used these sources for various purposes. Agency A also undertook pond dewatering (cleaning and draining of pond water, recharged with fresh groundwater), debris cleaning, drainage clearing and construction in the villages under the WaSH programme. The raising of structures above the flood levels was a crucial element for

¹²² Interview: INGO-3, Agency A, 18-11-13

¹²³ Document: Agency A Assam flood response 2012-13 report, 01-03-13

building resilience of water systems in the villages.¹²⁴ The water user groups received training and toolkits for maintenance and repair of handpumps.¹²⁵

“Rehabilitation and raising the structures, and construction of aprons around existing dug wells, handpumps are undertaken [...] But the challenges are the local context, local practices and how PHP can effectively introduce safe hygiene behaviour change.”¹²⁶

Agency A did not invest in provision of raised water sources for the highest flood-levels due to lack of financial resources to undertake such a project in the erosion-prone region, with the risk of losing the investments. Financing of water supply in rural areas was a challenge due to inefficiencies in the government development programmes, leaving the poor household to bear the additional costs of raising and maintaining the water sources, constructing raised platform with accessibility (steps) and drainage.¹²⁷ Micro-credit support for WaSH facilities was recommended through income-generating avenues, disaster insurance and damage compensation to influence greater uptake of WaSH facilities.¹²⁸

The sanitation response in Assam involved a phased approach: during the emergency, defecation areas were demarcated to control spread of diseases, and separate emergency latrines for men and women were constructed in the embankment camps.¹²⁹ Agency A was responsible for waste management and disposal, with minimal role of communities.¹³⁰ As the populations returned to their homes after the floods, or the pits were filled up, these facilities were decommissioned and materials were handed over to the communities to reuse.¹³¹ The longer-term sanitation measures included construction of communal latrines in the villages and latrine complexes on the raised flood shelters. Additionally, user groups were provided with cleaning materials, solar lamps for better security, and latrines with padlocks and keys

¹²⁴ Informal conversation: INGO 10, 04-01-13

¹²⁵ Interview: PH-1, Agency A PHP consultant

¹²⁶ Interview: PH 3 Agency A PHE

¹²⁷ Interview: INGO-3, Agency A, 18-11-13

¹²⁸ Interview: INGO-3, Agency A, 18-11-13

¹²⁹ Informal conversation: INGO 10, 04-01-13

¹³⁰ Interview: PH-3, Agency A PHE

¹³¹ Informal conversation: INGO 10, 04-01-13

for regular use and maintenance.¹³² The following year, when communities were displaced again, the group members used primitive forms of self-built latrines using the materials provided for the emergency latrines in 2012 (Section 5.2.5).

For hygiene promotion, Agency A undertook awareness campaigns for village members, and training and capacity building for community members, user groups and local facilitators. PHP efforts led to community mobilisation and increased ownership of the hardware.¹³³ The awareness programme provided hygiene messages on handwashing, household water treatment, promoting use of latrines, safe water and food handling practices. These activities included understanding and assessment of existing practices, promoting and sustaining behavioural changes. The local history, power relations, and social vulnerability were factors influencing programme targeting and beneficiary selection.¹³⁴

“Mostly the communities develop their understanding of the importance of handwashing these days due to the exposure in urban areas through media and advertisements; however they may not often practice as they don’t take it seriously. The job of the PHP team is make these linkages prominent and provide information on preventive measures to address the spread of diseases.”¹³⁵

For designing the hygiene messages, a WaSH KAP (knowledge, attitude and practices) household survey was undertaken to review the local context and existing hygiene practices at the household level. The survey results were used to identify key health risks in the areas, supplemented by the PHP team’s observations and participatory discussions with the communities.¹³⁶ The risky hygiene practices were identified, and relevant messages on maintaining safe water chain, handwashing, use of latrines, cleanliness and personal and environmental hygiene were communicated to the communities during household visits and

¹³² Interview: PH-1, Agency A PHP consultant

¹³³ Informal conversation: INGO 10, 04-01-13

¹³⁴ Interview: PH-1, Agency A PHP consultant

¹³⁵ Interview: PH-1, Agency A PHP consultant

¹³⁶ Interview: INGO-3, Agency A, 18-11-13

campaigns.¹³⁷ The end line survey was compared with the baseline for establishing changes in household practices and the effectiveness of programme.¹³⁸

The hygiene programming approaches included testing local water-sources and sharing the results with community members for understanding water-source contamination levels. The PHP team established linkages between diseases at the household level and contamination results.¹³⁹ The PHP activities involved female community members through mother's group meetings, training for user groups and adolescent girl members, street plays, competitive matches, sport-games, village campaigns and promotional events. The communication media included posters, banners, visual cards, and pamphlets, all printed in local languages. An inter-village volleyball tournament was organised in Morigaon, when different hygiene messages on handwashing, environmental cleanliness were repeatedly announced and IEC materials were displayed emphasising key hygiene messages (Image 5.22).¹⁴⁰



Image 5. 22: Boramari women members engaging in football as part of PHP campaign to promote key hygiene messages (Image courtesy: Agency A, 15-01-13)

¹³⁷ Informal conversation: INGO 10, 04-01-13

¹³⁸ Informal conversation: INGO 10, 04-01-13

¹³⁹ Interview: PH-1, Agency A PHP consultant

¹⁴⁰ Documents: Final Agency A report on Assam floods 2012-13

The economic condition of individual households influenced the adoption of new practices. It was also essential to influence cultural attitudes towards WaSH during community consultations and household visits for encouraging behaviour change.¹⁴¹ Local alternative solutions were recommended for poor households, who could not afford soap for handwashing, to use ash, soil, stone, vegetable skin or banana leaf ash. A year after the floods, communities exhibited awareness of risks of unhygienic practices during floods in causing diseases through adoption of household latrines, using cloth filters, and handwashing using ash after defecation.¹⁴²

PHP included interventions in the local schools and activities involving school children for hygiene promotion. In the makeshift school in Solmari, a hand pump was installed with apron and drainage to prevent seepage. In Boramari the school teachers were engaged for hygiene promotion and games for improving hygiene levels amongst children.¹⁴³ Between 2012-13 Agency A conducted 33 school-based events, in which 82 teachers and 3497 students (primary and middle school) participated in Sonitpur and Morigaon.¹⁴⁴ Personal hygiene messages included regularly cutting the fingernails, washing hair and bathing every day.¹⁴⁵

“Children in rural areas walked barefoot; making footwear to schools compulsory did not solve the problem because children lost their chappals (slippers) in school. The poor households were not able to afford to buy for all their kids, therefore the PHP team advocated washing the feet of the children before they went to bed. This helped to prevent the spread of germs through feet due to walking barefoot in the fields where open defecation was prevalent.”¹⁴⁶

Agency A also provided intermediate shelter to 150 households in Assam under the ECHO recovery programme. Its shelter programme had two components: distributing tarpaulins,

¹⁴¹ Interview: PH-1, Agency A PHP consultant

¹⁴² Interview: PH-2, Agency A PHE

¹⁴³ Informal conversation: INGO 10, 04-01-13

¹⁴⁴ Documents: Final Agency A report on Assam floods 2012-13

¹⁴⁵ Informal conversation: GO-7, 29-08-13

¹⁴⁶ Interview: PH-1, Agency A PHP consultant

nylon ropes and ground sheets to each household for emergency shelter during the floods; and transitional shelter provision to targeted households consisting of local materials like bamboo, *chotai* (jute-mats), and j-hooks, corrugated galvanised iron (CGI) sheets procured from local vendors.¹⁴⁷ In Solmari, 61 households and in Boramari 25 households received intermediate shelters.¹⁴⁸ The design prototype was finalised after community consultations and technical expert guidance, to suit their cultural practices and acceptance. Resilience features, building houses on raised plinths, were incorporated to prevent water inundation during floods. The use of local materials and design enabled the houses to be easily dismantled during displacement.¹⁴⁹ The houses were supported with plinth bands and additional protection for the roof for stability, as Assam is located in Zone 4 for earthquake risks.¹⁵⁰

Agency A provided limited numbers of transitional shelter by targeting most vulnerable and needy households based on selection criteria: poor, affected, women-headed, elderly, disabled, and landless households. However this excluded other households within the same communities who had suffered losses during the floods but did not receive shelter support. Agency A encouraged owners of the houses to engage in the construction process, facilitating a owner-driven approach. This approach – including provision of locally available shelter materials – was useful in resource-constrained environments where houses, land and livelihood assets were regularly lost to disasters. There were challenges of establishing land ownership and ensuring land is available for landless households.¹⁵¹ In Boramari, displaced houses that did not possess land papers were supported based on needs and vulnerability with approvals from the *gaon Panchayat*.¹⁵²

Under livelihood interventions, Agency A focussed on cash transfers to facilitate emergency household income: an amount of ₹ 6800 either as cash for work (CFW) or as unconditional cash transfers (UCT). The households were targeted at, using inclusive selection criteria

¹⁴⁷ j-hooks are for support, attachable to ceilings, walls, concrete or flanges

¹⁴⁸ Documents: Final Agency A report on Assam floods 2012-13

¹⁴⁹ Informal conversation: INGO 10, 04-09-13

¹⁵⁰ Document: Shelter Construction and Monitoring Steps

¹⁵¹ Document: Shelter Construction and Monitoring Steps

¹⁵² Document: Shelter Justification Note – 23 November 2012 – Morigaon Field Office

defined during community consultations. These criteria included poorest and most vulnerable households, those affected by floods and erosion, and those suffering from loss of livelihoods and household assets, especially women-headed households and those with elderly or disabled members. The CFW activities involved community development or flood-rehabilitation projects.¹⁵³ After community discussions, activities were proposed based on disaster risks, hazards and needs: these included repair/construction of access roads, construction of raised platforms for flood shelters and school platforms. The wage rates were kept at a lower rate than the market price and government wages on MGNREGA, to encourage those members who had access to the markets to opt out of the CFW project.¹⁵⁴ The project amenities at the village level included a work-shed for participants to rest, drinking water, first aid kit, crèches, biscuits and toys for the children of women participants, and urinals for the workers.¹⁵⁵ Since more than 50% women participated, their daily workload increased. Hence work-times were flexible to include women's availability and school timings.¹⁵⁶

5.6.2 Institutional approaches and capacities

This sub-section explores the extent of participation in WaSH humanitarian programmes and agency capacities to respond through learning approaches and partnerships.

Agency A involved the Village Development Committees (VDC), comprising village leaders, elders, traditional leaders and community members, for emergency kit distribution and immediate relief.¹⁵⁷ For the recovery phase, pre-existing village WaSH committee (if non-existent new committee was constituted) were involved in latrine construction and hand pump rehabilitation. Detailed guidelines were made available to the programme staff that detailed the social processes and step-by-step procedures before, during and after latrine construction.¹⁵⁸ During the initial village meeting, understanding of specific needs related to defecation and potential latrine sites, materials and volunteers' availability was developed.¹⁵⁹

¹⁵³ Informal conversation: INGO 10, 04-01-13

¹⁵⁴ Document: RTE report, January 2013 and Workshop notes: Guwahati

¹⁵⁵ FGD (mixed): Solmari, 13-01-13

¹⁵⁶ Document: Final Agency A report on Assam floods 2012-13

¹⁵⁷ Project staff meeting: Morigaon 06-01-13, Solmari 09-01-13,

¹⁵⁸ Document: Social process of latrine construction, Agency A

¹⁵⁹ Interview: LA-6

Subsequently, the pit-latrines design and functions were shared with the committee members for finalisation based on previous flood levels and community preferences. These were followed by a technical site-feasibility study for water availability and potential groundwater contamination depending on the distance from water sources, soil conditions, drainage and seepage conditions, and the number of users per toilet.¹⁶⁰ Agency A's technical project staff supervised and trained the field staff, masons and local households on latrine design, construction, use and maintenance of the latrines.

For rehabilitating handpumps, the water Committees and user groups were consulted to understand technological considerations for water supply facilities.¹⁶¹ During community consultations, available sources, collection points and distances from settlements were discussed. Community participation enabled identification, selection and prioritisation of the handpumps based on access, previous flood levels and the number of users.¹⁶² Technical sanitary surveys indicated the distance of water sources from latrines, the age of tubewells, presence of platforms, and if waste water is collecting on the ground around the sources.¹⁶³ This survey did not include the location and extent of the waste water collection. In Sonitpur, where the programme was discontinued subsequently due to lack of funding, the toolkits were handed over to village committees and user groups.¹⁶⁴

“Initially during the emergency it was very difficult to engage the communities because of the frequent displacement and the need to take swift action; only women were available for consultations, the men were away looking for labour work in the towns. We consulted women regarding decisions about beneficiary identification or site selection. In the Muslim communities, men were the decision makers, so they revisited and changed the women’s decisions saying that women are ignorant of such issues as

¹⁶⁰ Interview: PH-2, Agency A PHE

¹⁶¹ Interview: PH-2, Agency A PHE

¹⁶² Informal conversation: INGO 10, 04-01-13 (Tubewells not more than 3-4 years ago (in case of Hand pump less than 3-4 years).

¹⁶³ Interview: PH-1, Agency A PHP consultant

¹⁶⁴ Field note – Morigaon, January 2013

*they were uneducated. This was a major reason for [a] lot of language problems between the field staff and the communities.*¹⁶⁵

The above quote indicates that women's participation and community feedback varied: in Muslim communities, the participation of women-folk is limited due to the system of *Purdah* – where women are restricted in their public movements by covering their faces.¹⁶⁶ In Morigaon, because men had migrated to cities, women were responsible for household decisions.¹⁶⁷ The programme relied on community consultations and was sensitive to vulnerable households' needs, but their inclusion in decision-making was minimal. In Solmari the shelter and livelihood support was extended to mentally disabled couple in the village as their names were listed during community consultations.¹⁶⁸

The institutional capacities and abilities to monitor assess and initiate immediate response after disasters were influenced by enhanced finance and logistical systems, local partnerships, human resources and preparedness to respond to disasters.¹⁶⁹ The funds for initial humanitarian support were self-generated by Agency A and its international affiliate partners; ECHO funded the early recovery programme for 6 months. The disaster fund-raising was specific for the emergency phase, and not for a longer duration. The agency had limited capacities for fund-generation and limited resources to address underlying socio-economic vulnerabilities and household poverty, or issues related to frequent displacement and recurring erosion.

The limited funding resulted in a streamlined programme, which included the neediest and marginalised groups.¹⁷⁰ The pre-positioned contingency stocks were immediately deployed to the affected areas, and were replenished with donor money.¹⁷¹

¹⁶⁵ Interview: LA-6, Agency B

¹⁶⁶ FGD (mixed): Solmari, 13-01-13

¹⁶⁷ Interview – Expert-2 14-11-13

¹⁶⁸ FGD Solmari and Bachadangi 05-09-13

¹⁶⁹ Interview: INGO-9

¹⁷⁰ Interview: PH 2

¹⁷¹ Informal conversation: INGO 10, 04-01-13

“Sonitpur was a temporary intervention – an assessment post-relief phase was carried out based on which a joint proposal was submitted to DIPECHO [ECHO’s Disaster Preparedness funding] proposal along with [Agency AA] and [Agency CA]. As the proposal was rejected, the work in Sonitpur was discontinued due to lack of secure funds.”¹⁷²

The local partnerships depended upon the local agency’s interests and capacities, as well as its familiarity with local context and humanitarian background.¹⁷³ In Morigaon, partner Agency B had developed a local presence and advocacy with government for adoption of raised latrine models and advocated for safer land for the displaced communities. Contrastingly in Sonitpur, partner Agency C had limited experience and mandate for working in emergencies.¹⁷⁴ As the programme depended on donor funding timelines, it adopted a non-interventionist approach during the recurring floods in 2013 due to lack of funding. The programme was discontinued from Sonitpur and in Morigaon the on-going DRR programme was implemented through partner agency B.¹⁷⁵

The programme implementation involved consultants, partner staff or fresh recruits. The knowledge retention depended on the involvement of the core staff during the programme implementation, but there was high staff turnover in the organisation, which affected institutional memory. The team members required training on gender sensitisation, logistics and financial systems, and sector-specific expertise.¹⁷⁶

“With response each year, the same set of consultants are part of the team, this increases familiarity and ways of working awareness. Basic orientation is needed on how to manage float [cash used for daily/weekly office and programme expenses], maintain records, systems and approvals etc.”¹⁷⁷

The organisational learning mechanisms, lessons learnt and documentation captured the

¹⁷² Interview: INGO- 3, 18-11-13

¹⁷³ Interview: LA-2, Agency C

¹⁷⁴ Interview: LA-5, Agency B

¹⁷⁵ Informal conversation: INGO 11, 04-02-14

¹⁷⁶ Interview: PH-1, Agency A PHP consultant

¹⁷⁷ Interview: PH-2, Agency A PHE

emergency and recovery operations and influenced organisational learning, preparedness and institutional capacities to respond to disasters effectively.¹⁷⁸ During real-time evaluations (RTEs) in the programme, external evaluators provided objective feedback on the programme based on certain global benchmarks.¹⁷⁹ Agency A was evaluated against these benchmarks to provide quick fix solutions, short-term gains and longer-term challenges.¹⁸⁰ Agency A implemented RTE recommendations such as provision of solar lamps to every household to provide women's safety and security in the dark. However the RTEs failed to capture underlying challenges: what solutions were implemented in WaSH, how effective and useful they were, and how these solutions sustained over the years.

There were other challenges in documenting the programme experiences and lessons, especially in WaSH:

“One of the challenge is weak documentation mechanisms, and documentation rarely goes beyond the donor requirements and reporting guidelines. In WaSH particularly there are a lot of processes and standards adopted in interventions. While working in emergencies quick impacts solutions are readily implemented, which may have limited long term viability but these decisions are not captured at all.”¹⁸¹

5.6.3 Consortium-based and collaborative efforts

The European Union provided EUR 2,000,000 for humanitarian assistance to over 80,000 flood victims in Assam for a maximum duration of 6 months (ECHO 2012). Agency A participated under a consortium headed by Agency AA with Agency CA under the 'Humanitarian assistance to vulnerable populations affected by floods in Assam' programme. In this study, the participating members: Agency AA, and CA were interviewed to understand the experiences of working in a consortium, each with different expertise and strengths

¹⁷⁸ Interview: INGO- 1 Agency A

¹⁷⁹ Document: Agency A: RTE Benchmarks.

¹⁸⁰ Field notes: RTE workshop, 22nd February 2014, Puri, Odisha: The RTE benchmarks included: Speed and timeliness of the response better in relation to other actors, with consideration of emergency preparedness measures in place; quality and scale appropriate to the context and capacity, and is valued by the affected population; Effective management structure to provide clarity and well-communicated decision-making and direction (including partners) and is appropriately accountable to the affected population; key support functions are sufficiently resourced and being effectively run. Risks that are being taken are being calculated and documented; internal (agency affiliates') relationships are productive and well-coordinated; considerations of the longer term implications and connectedness; campaigning, advocacy, media and popular communications, or a combination of these tools, appropriate for the context are executed effectively.

¹⁸¹ Interview: LA-2, Agency C

leading specific sectors and working under common objectives. The consortium approach enabled a wider coverage, and funding support.¹⁸²

The varied contexts within the state meant agencies had to take different approaches within the programme. For instance in *Mishing* communities in Upper Assam where houses were built on stilts, Agency CA and partners constructed *chang ghars*; while in Morigaon the structures had to be mobile for easy dismantling during floods and erosion. Similarly in WaSH, Agency AA built raised handpumps on concrete platforms above previous flood levels to prevent inundation during floods, and ensure continuous access to safe water (Image 5.23). Agency A did not construct raised handpumps because its local communities could access the raised structures during floods only with the help of boats, and there was risk of losing the investments in raising WaSH facilities due to erosion. Within consortia the agencies exchanged ideas, and mutual learning formed the basis for different strategies in implementation. However the consortium was limited to the programme duration, and did not function beyond the donor provisions. There were delays in decision-making, in gaining consensus as agencies had different ways of working.



Image 5. 23: Raised hand pump by Agency AA (Image: Sonitpur, 17-01-13)

¹⁸² Interview: INGO-4

There were other forms of collaborative efforts in Assam including Inter Agency Groups (IAGs), informal district networks and coordination mechanisms that were active during the monsoon season, but did not extend into recovery efforts.¹⁸³

5.7 Chapter Summary

This chapter describes post-disaster changes in WaSH practices, availability and access to WaSH facilities, and use of technologies in WaSH during recovery. Under learning and knowledge pathways for resilience, the data show resultant hygiene behavioural changes triggered by social and experiential learning. The WaSH practices evolved based on motivation, learning from each other and from the humanitarian agencies and from the experiences of recurring floods and erosion. Due to lack of knowledge at household and community level, the mobility and relocation as a coping strategy worked for some aspects of resilience but posed challenges for moving fixed WaSH technologies during displacement. The study of institutional pathways showed different recovery priorities and perspectives for government and humanitarian agencies. The government undertook relief measures as per national guidelines. It followed state policies for disaster management and continued development assistance through existing schemes – water supply, sanitation, housing, and rural employment. The long-term power generation projects continued through construction of dams in upstream Brahmaputra. In participation as a pathway for resilience, there was limited participation in the government decision-making. The local government undertook embankment construction with nominal community participation. On the other hand, humanitarian agencies encouraged small numbers from the communities to participate in standard recovery interventions - building houses, cash for work - without addressing root causes of vulnerability. Agencies provided communal WaSH services, which were not equitably accessed by the marginalised sections of the communities in Solmari. In terms of integration as a pathway, humanitarian agencies ceased their programme in the affected communities, handing over the longer-term recovery needs as the responsibility of the government. To achieve sectoral integration, Agency A coordinated efforts in WaSH, cash for work and shelter projects through village-level communities.

¹⁸³ Interview: INGO – 5, 02-10-2013

Chapter 6: Odisha Case Study

This chapter describes Cyclone Phailin and subsequent floods (Section 6.1); WaSH practices at the household level (using data from PLA tools, household interviews and observations) (section 6.2); and community changes and priorities during recovery (using data from change analyses and priority ranking exercises) (section 6.3). It reviews semi-structured interviews and documents to describe the local recovery initiatives (section 6.4), government response (section 6.5), and the responses by Agency A and other humanitarian NGOs (section 6.6).

6.1 Cyclone Phailin and floods, 2013

Cyclone Phailin, categorised as Very Severe Cyclonic Storm, made its landfall in Odisha on 12th October 2013, and affected Ganjam, and Puri; subsequent floods hit Balasore (IMD 2013). This research focuses on Puri and Balasore (Figure 6.1)

Odisha Study Map

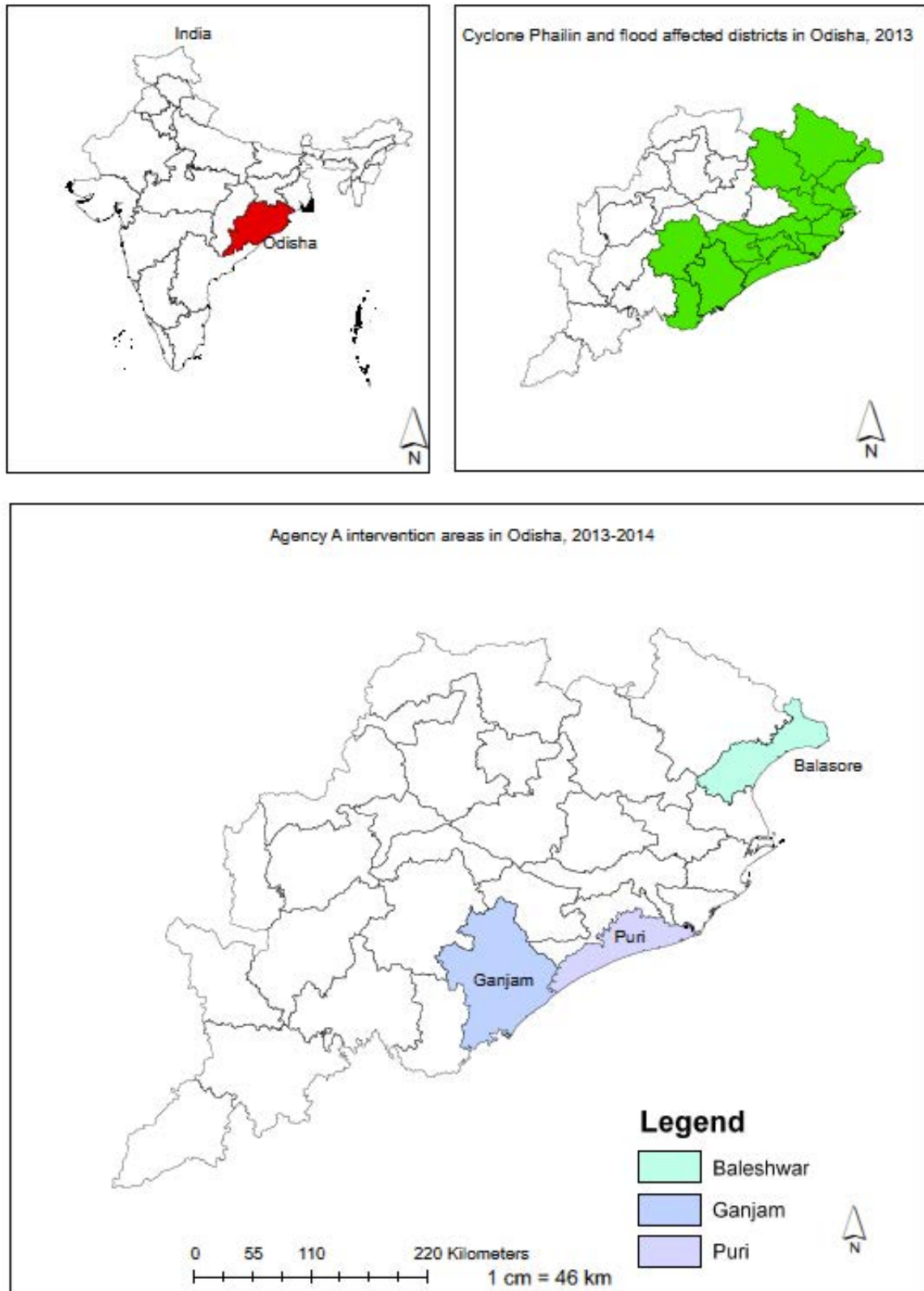


Figure 6. 1: Map indicating affected districts in Odisha by cyclone Phailin and floods and Agency A intervention areas in 2013-14 (Adapted from Map Action, 28 October 2013)

The cyclone killed 44 people, damaged 256,633 homes and affected 13.2 million people (World Bank 2013). In Puri, KrushnaPrasad, Brahmagiri and Kanas blocks were affected.¹⁸⁴

The cyclone resulted in heavy rains causing the rivers Baitarani, Budhabalanga, Rusikulya, Subarnarekha and Jalaka to overflow and cause floods in Mayurbhanj, Balasore, Bhadrak, Keonjhar, Jajpur and Ganjam. The floods affected 1.2 crore people in 16000 villages and 2015 gram panchayats. In Balasore, Basta, Baliapal, Bhograi and Jaleshwar blocks were affected.¹⁸⁵

6.1.1 Timeline of events

Accurate weather forecasting, effective planning, and the dedication showed by the administrative machinery ensured almost 'zero casualty' during the cyclone (Dash 2013). The government, humanitarian and community agencies mobilised evacuation, early search and rescue teams and coordination efforts immediately (Table 6.1). International donors – UK AID, ECHO, World Bank (WB) and Asian Development Bank (ADB) provided financial support in response to the disaster. UK AID provided £2m through its Rapid Response Facility (RRF) for responding to the immediate humanitarian needs for implementation from 1st November 2013 for 12 weeks (UK AID 2013). The European Commission provided €3 million to provide assistance to cyclone-affected populations (ECHO 2013).

Table 6. 1: Timeline of events in Odisha, October 2013 - March 2014 (Source: Agency A)

Date	Timeline of events in Odisha
09/10/2013	Cyclone Phailin warning circulated and processes of evacuation, communication initiated
11/10/2013	Cyclone preparedness measures initiated by GoO
12/10/2013	Cyclone Phailin made landfall at Gopalpur, Ganjam on the night of 12th October 2013; Google Crisis Response team began responding by providing a disaster onebox to users in India with the details from the national weather agency, the IMD; as the official IMD website crashes
14/10/2013	Reports of floods in Balasore, Mayurbhanj districts
15/10/2013	Agency A visits Balasore for Needs Assessment after floods; ECHO Assessment mission to Ganjam, Puri and Balasore (15 – 18 Oct); Agency E seeks support from district authorities for relief and food to be distributed to flood-affected families in Balasore.
19/10/2013	Food distribution in Sanpatana, Puri and Ganjam, and community kitchens by Agency E in Balasore; UK AID - assessment mission in Ganjam - Puri – Balasore
21/10/2013	Forecast of heavy rainfall in cyclone and flood affected villages in Odisha

¹⁸⁴ Meeting: Emergency officer, Puri 24-10-13

¹⁸⁵ Orissapost News article 15-10-2013 *Twin disasters*

26/10/2013	UK AID RRF activation and call for proposals meeting and decision to form consortia
27/10/2013	Field visit to Brahmapur and Khirisahi islands, during heavy rains and inundated areas in low-lying parts of the islands by the author
27/10/2013	Arakhakuda food distribution
28/10/2013	Training of DRR hand pump technicians for chlorination and hand pump repair in Puri - facilitated by Agency D; UK AID RRF proposal submitted by the consortia led by Agency CA, where Agency A was the Logistics lead
29/10/2013	First meeting of successful consortium members in Bhubhaneshwar win the application for GBP 1 million for 14100 households which was revised to 16170 households
31/10/2013– 7/11/2013	Islamic Relief food distribution in Puri villages – Pirosahi, Padanpur, Arakhakuda, Brahmapur and Khirisahi (and others)
10/11/2013	48 hour Livelihood assessment Toolkit training
12/11/2013	NFI kit distribution started in Sanpatana, Puri
15/11/2013	Consortium members submit proposal for ECHO programme
14/11/2013- 24/11/13	Humanitarian Services Support Professional from GB (WaSH) visit to Odisha
24/11/2013	Director Programme and Advocacy and Regional Manager visit Arakhakuda, Sanapatna, Puri
3- 4/12/2013	ECHO Project review and planning meeting in BBSR - Puri and Ganjam
6/12/2013	Ambassador to India from European Union with EU officials, Ambassador to India, Czech Republic, Ambassador of Hungary to India, ECHO - Communication and Visibility visit Sanpatna in Puri district
8/12/2013	Gopinathpur inland villages receive first UK AID kits
25/12/2013	First cash distribution - CFW and UCT by Agency A in Puri
15/01/2014	Livelihoods support to farmers in Puri -distribution of seeds and seedlings by Agency A
23/01/2014	Completion of UK AID supported NFI distribution by Agency A
28/01/2014	UK AID High Commissioner meeting for UK AID consortium members; Orientation - Village Representatives, WaSH Team and Volunteers on Community Based Water Purification (Puri)
4-10/02/2014	Inter-agency needs assessment with consortia members in worst affected non-priority Gram Panchayats in Odisha - Puri and Ganjam (Sphere/ECHO/Consortium)
6/02/2014	Gender assessment in Puri by Agency A
5 & 6/02/2014	Consortium Shelter TOT in Ganjam
8 & 9/02/2014	Consortium Gender in Emergency training
11-22/02/2014	Real-time evaluation by Agency A
3-8/03/2014	Balasore UK AID, ECHO Monitoring visit and research field preparation visit.
8/03/2014	Novib Donor visit, Sanpatna

The support provided by government agencies and humanitarian actors varied according to prioritisation of villages and households affected by cyclones, floods and erosion. The government provided 50 kg of rice, tarpaulin and INR 500 cash (50 GBP) to each of the households in cyclone-hit Puri, while the flood-affected households in Balasore received 25 kg rice and INR 250 (25 GBP). There were disparities in Agency A's humanitarian response in Odisha, depending on donor funding. The affected villages were differentiated as per the donors – UK AID, non-UK AID and ECHO (for recovery) – for the distribution of kit items, the items received under each donor, the time of distribution, and recovery support. The most affected villages were prioritised for immediate kit distribution, which included some of the items shown in Figure 6.2, and recovery support.¹⁸⁶ Other affected villages – Gopinathpur, Brahmapur and Khirisahi – received complete package under the UK AID project in December 2013 (Figure 6.2).¹⁸⁷ The water filters and kitchen sets were targeted at women-headed households, and were not provided to all households.

List of Non Food Items (NFI) Per Household		
SI no	Item	Qty (number)
1	Plastic Bucket with lid - 14 Litre capacity	2
2	Plastic Mug, 1 Litre capacity	1
3	Household water filter	1
4	Fleece Blanket 200 x 200 cm	2
5	Utensils Kit- Steel Plate 4 Pcs, Steel Glass-Size-250 MI-2 Pcs, Steel Serving Spoon - 2 Pcs, Cooking Spoon-(1) Ladle-85 Gms and (2), Aluminium Kadai-2 Liter Capacity- 1 Pcs, Aluminium Dekchi with Lid-7 Liter capacity, 1 Pcs, Steel Bowls-Weight each 50 Gms- 4Pcs	1 Set
6	HDPE Tarpaulins, SIZE 12 X 18 Feet and 180 GSM	1
7	HDPE Ground sheet 140 GSM, size 12 X 9 Feet	1
8	Nylon Rope - 6 mm thickness with length 15 meters	1
9	Solar Lantern with Solar Charger, Multiple mobile charger, AC Adaptor with Battery	1
10	Bathing Soap:120 gms: Brand Medimix	8 numbers
11	Detergent cake- 100 Gms -Brand or Wheel	8 numbers
12	NADCC Tablets (Brand Aquatabs .67 mg for 14 lt water storage container)	6 Strips of 10 Tabs each
13	Sanitary Cloth (4 meters of cloth-Width-40 inch with Suede Bag and with 2 meters cotton rope)	1 Pcs
14	ORS Brand-S&P- 1 litre sachet-contains 21.50 Gms	5 Pcs
15	Steel Nail cutter-Medium Size-Only for Nail cutting-Length-7 Cm	1 Pcs
16	Plastic Comb-12 Inches-Unisex	1 Pcs
17	Savlon (anti septic and Disinfectant) 100 ML	1 bottle
18	Cotton swab- 100 gms -Sterilized	1 Pcs
19	Soap case / Container for 120 Gm Soap	1 Pcs

Figure 6. 2 Household kit items and quantity of NFI kits provided by Agency A

¹⁸⁶ Document: Muster rolls distribution dates Sanpatna (12/11/2013 & 14/11/13), Arakhakuda (15/11/2013), Padanpur (13/11/2013), Pirosahi (14/11/2013)

¹⁸⁷ Document – Agency A List of project villages – December 2013

6.2 Household WaSH

Cyclone Phailin and the subsequent floods affected household assets and WaSH facilities. This section presents data on household impacts, WaSH damages and hygiene practices from household interviews, PLA tools and FGDs. The data are organised into pre-disaster, during disaster and improved WaSH context within the 10 study villages in Puri and Balasore. This section describes – pre-disaster WaSH (interviews and FGDs), immediate impact on WaSH facilities (transect walks, and observations); the WaSH situation in relief camps (FGDs and interviews), and improvements in the WaSH situation. The recurring themes include access to water sources and sanitation facilities, use and maintenance of facilities, water quality measures at household level, roles and responsibilities, and changes in hygiene practices. Agency A classified villages for programming as coastal, inland and island depending upon their geographical characteristics.¹⁸⁸

Men and youth in Odisha migrate for work to Kerala, Karnataka and Tamil Nadu – Puri has a 27% household migration rate (Sharma et al 2014). Odisha villages are characterised by a complex interplay of caste, class and gender mediated by the circumstances emerging in multiple disasters (Ray-Bennett 2009 p.18). The majority of coastal and island population are engaged in fishing or allied activities and belong to the Noliya community who had migrated from Andhra Pradesh (Mohanty et al., n.d). In Sanpatna, 95% of the population comprises Beheras.¹⁸⁹ The Bisois (2%), the poorest fishing groups, live on islands and sandbars in the Chilka Lake, without proper access to WaSH, health and education facilities.¹⁹⁰ In the inland villages, the households depend on dry fruit cultivation and daily wages labour (DWL). Padanpur consists of landless labourers who depend on big farmers, landowners and fishermen for income.

These socio-economic factors (table 6.2) influence access to WaSH facilities in the villages.

¹⁸⁸ Meeting: RTE team Debrief – 11-02-14

¹⁸⁹ The statistical information of family titles were inferred from Agency A distribution records (muster rolls)

¹⁹⁰ Food distribution – 7-11-13, Arakhakuda

Table 6. 2: Typology of study villages in Puri and Balasore (Source: Agency A, 2014)

Typology	Gram Panch	Village	No of HHs	Water sources	Profile
Puri District					
Coastal	Arakhakuda	Sanpatana	300	13 handpumps, 3 wells, 1 pond	Fishing
		Arakhakuda	1250	558 handpumps, 3 wells	Fishing
Island	Brahmapur	Brahmapur	500	5 handpumps, 1 pond	Traders
		Khirisahi	300	26 handpumps, 1 pond	Fishing
Inland	Manika	Padanpur	25	3 handpumps	Landless labourers
	Arakhakuda	Pirosahi	70 (Muslim)	16 handpumps, 1 open well	Labourers
	Arakhakuda	Sahadevpur	25	25 handpumps, 1 well	Farmers
	Arakhakuda	Gopinathpur	310	37 handpumps, 1 well and 1 pond	Labourers
Balasore District					
Riverine	Basta	Chadanamkhana	28	25 handpumps, 1 well	Erosion and floods
	Raghunathpur	Gombhoria	45	Public piped water supply, 1 hand pump and 1 pond	Floods

6.2.1 Pre-disaster WaSH

The rural population in Puri and Balasore depend on ground water sources for their daily household purposes.¹⁹¹ In Balasore, it emerged that river and ponds were primary sources of water and 10% of the population had access to tube wells.¹⁹² A KAP baseline survey indicated that 77% of respondents used tubewells, 18% depended on dug wells, 4% on public water supply and 1% on rivers, ponds and other open water sources.¹⁹³ Government provided 58% of the sources; the rest were private and communal sources.

In Puri, artesian wells were common and traditionally used.¹⁹⁴ These are considered unsustainable by the humanitarian agencies – the unregulated water-flow exhausts the

¹⁹¹ Interview: LA-8 and Interview – PH-3

¹⁹² Informal conversation – LA -13

¹⁹³ Document: KAP report February 2014

¹⁹⁴ An artesian well is simply a well that doesn't require a pump to bring water to the surface; this occurs when there is enough pressure in the aquifer. The pressure forces the water to the surface without any sort of assistance.

groundwater source and wastes water (Image 6.1).¹⁹⁵ There were raised water sources in Puri, constructed under the flood rehabilitation project in 2001 by the Orissa State Branch (OSB) of the Indian Red Cross Society (IRCS) (IFRC 2002). There were others constructed after the 1999 super cyclone by Spanish Red Cross (see Image 6.2). However, these facilities were not maintained: image 6.3 shows a well without cover to prevent dust and debris from falling into the water source. The KAP report suggests there were access issues in Puri – 79% of the respondents reported 30 minutes queuing time, and 5% of the respondents claimed they waited for an hour to collect water.¹⁹⁶



Image 6. 1: Artesian wells, with non-stop water flow (Image: Brahmapur, 27-02-14)

¹⁹⁵ Informal conversation: LA -14

¹⁹⁶ KAP survey indicates data from Puri and Ganjam and excludes Balasore.



Image 6. 2: Pre-existing tube well built under Spanish Red Cross project as a preparedness measure after the 1999 super cyclone (Image: Piroshahi, 08-11-13)



Image 6. 3: Pre-existing open well by Panchayat (Image: Gopinathpur, 28-10-13)



Image 6. 4: Deteriorating conditions of the water pumps in the island village (Image: Khirisahi, 27-10-13)

The existing structures were susceptible to disasters due to lack of repair or maintenance (Image 6.4). The facilities had deteriorated over the years due to lack of regular maintenance, resulting in cracks that led to groundwater contamination. An expert engineer, who observed community practices and the impact of the cyclone on WaSH facilities in Puri during his visit to Sanpatna and Brahmapur, noted,

“Many people rely on drinking water taken from open wells or partially open wells. The very nature of these types of water supply means they are susceptible to contamination either from the well becoming inundated during a flood or from debris being blown into the well during a storm. Often the apron around open wells is not totally effective, increasing the risk of water in the well becoming polluted when there is standing water around the wellhead. The result is that the water quality in poorly maintained open wells deteriorates due to a cyclone.”¹⁹⁷

In Odisha, open defecation was rampant: only 15 per cent of households in Odisha had access to improved sanitation.¹⁹⁸ The KAP report stated that 58% of the respondents defecated in

¹⁹⁷ Document: Agency A - Comments on the Joint assessment report, for WaSH sector - Post Phailin Response (22-11-13)

¹⁹⁸ Document: Agency A, Comments on the Joint assessment report, for WaSH sector - Post Phailin Response (22-11-13)

open fields, 25% near open water sources and only 7% used latrines.¹⁹⁹ It emerged that women went behind the bushes for defecation in the dark or after sunset, or before sunrise, to avoid being seen by others.²⁰⁰ Household latrines and latrines in the existing cyclone shelters were uncommon.²⁰¹ A local NGO official noted, *“There is no household toilet in any of the villages in Puri, not even in the hotels on the roadsides; even the staff have to urinate in the open during field visits.”*²⁰² This was a problem that I faced during my fieldwork too.²⁰³



Image 6. 5: Pre-disaster household latrine (Image: Gombhoria 03-03-15)

¹⁹⁹ Document: Agency A KAP baseline Report – February 2014, page.14

²⁰⁰ FGDs (women): Sanpatna 02/11/2013, Khirisahi 28/10/2013; Gopinathpur 08/02/2014

²⁰¹ FGD (women): Sanpatna 2/11-2013 & Khirisahi 28/10/13

²⁰² Informal conversation: LA -14

²⁰³ Field notes, Sanpatna (20-10-13), Brahmapur and Khirisahi (27/10/13)



Image 6. 6: Submerged India Mark-2 hand pump (Image: Brahmapur, 28-10-13)

In Gombhoria, 12 households had constructed latrines with the help of first instalments received under the government – the District Water and Sanitation Mission (DWSM) – schemes for sanitation provision and had access to one hour each day piped water supply. Mr O1 (36, M) owned a latrine in 2001 with funding for 3 concrete rings from the DWSM (Image 6.5).²⁰⁴ In Chadanamkhana there were 25 tubewells used for various purposes.²⁰⁵

6.2.2 Immediate Impact of disaster on WaSH

The disaster impacts on WaSH facilities depended on the household location and the nature of the hazard (cyclone in Puri and floods and erosion in Balasore). All these disaster impacts affected household access to WaSH facilities. In Balasore, due to erosion, the handpumps were washed away, while the floods resulted in water inundation. The storm surge during the cyclone caused structural damages to the WaSH facilities near the coast and the Chilka Lake,

²⁰⁴ Household Interview: O1, Gombhoria 3-03-14

²⁰⁵ Field Notes: FGDs (women and children) Chadanamkhana 04-02-14

affecting the water quality. The hand pumps were submerged and open wells were inundated by saline water in the island and coastal villages (Image 6.6).²⁰⁶

“Many handpumps observed, particularly those installed by the government, lack aprons and it is very much doubted that sanitary seals have been added during the construction of the boreholes. As such the risk of contamination from standing water during a flood event is higher than if the boreholes have sanitary seals and concrete aprons. Handpumps which have been inundated as a result of the cyclone should be assumed to be contaminated and should be disinfected. At some handpumps the salinity was found to be high but it is not known if this is connected with the recent cyclone or the levels are typically high.”²⁰⁷



**Damage to
water
source
caused by
storm surge**

Image 6.7: Pre-existing protected open wells suffered structural damage during the cyclone

(Image: Gopinathpur, 28-10-13)

²⁰⁶ Field notes, Household visits – 28th October 2013, Sanpatna village

²⁰⁷ Document –Comments on the “Joint assessment report, for WaSH sector - Post Phailin Response” (22-11-13)



Image 6. 8: Debris near handpumps (Image: Gopinathpur, 24-10-13)

In Khirisahi, due to heavy rains and floods, community members reported children suffered from diarrhoea and vomiting; and there were challenges in accessing the health facilities in the mainland from the island villages.²⁰⁸ Incidences of diarrhoea were also reported in Arakhakuda due to contamination of water sources and lack of water treatment measures.²⁰⁹ As part of Agency A, I undertook household visits to understand the causes of the outbreak in Arakhakuda, where it emerged that handwashing after defecation was not a common practice; the water containers were not cleaned or covered during transportation and storage; children's faeces were disposed in the backyard near the Chilkha lake; and garbage was littered without proper disposal mechanisms.²¹⁰

For menstrual hygiene, the households received one piece of cloth (4 meters), cotton rope for tying and detergent soap (8 pcs.). This support was inadequate if there was more than one menstruating member in the family.²¹¹ During FGDs with adolescent girls and women, the different menstrual hygiene practices were discussed: sanitary materials, changing and

²⁰⁸ Field notes: Khirisahi field visit 28-10-13

²⁰⁹ Email: Diarrhoea response decisions, 4-11-13

²¹⁰ Documents: Field survey –Post – Diarrhoea outbreak in Arakhakuda case-tracing of households – 08-11-13

²¹¹ FGD (Women): 06-02-14, Gopinathpur

disposal mechanisms and socio-cultural attitudes related to menstruation.²¹² In the fishing households, women used old rags and cotton sarees during menstruation, washed with a separate soap and reused the next month.²¹³ In the inland villages, the adolescent girls preferred sanitary pads but could not afford them. The general practice was to change once each day of the cycle and burn with other garbage.²¹⁴

6.2.3 WaSH facilities in relief camps

The cyclone shelters in Puri had the standing capacity for 1000-1200 people, with limited access to WaSH facilities.²¹⁵ The uncovered wells in the shelters were covered by debris (Image 6.9).²¹⁶



Image 6. 9: Open well with debris (Image: Sanpatna, 20-10-13)

²¹² FGDs (women): Sanpatna, Padanpur, Piroshahi, Gopinathpur, Arakhakuda, Khirisahi and Haripur hamlets (Feb, 2014)

²¹³ FGD (Women): 06-02-14, Gopinathpur, Arakhakuda

²¹⁴ Household interviews: 24-10-13, Gopinathpur, Sanpatna and Piroshahi

²¹⁵ Informal conversation: LA -14 & Field notes, Sanpatna (20-10-13), Brahmapur and Khirisahi (27-10-13)

²¹⁶ Field visit: Sanpatna, Arakhakuda (20-10-13) and Gopinathpur (28-10-13)



Image 6. 10: Women collecting water (Image: Khirisahi, 28-10-13)

The open sources were covered with debris (Images 6.7 and 6.8). In most areas, water had turned brackish; but despite this, households used the sources due to lack of alternatives.²¹⁷ In Puri (Sanpatna, Padanpur, Brahmapur and Khirisahi), the existing functional water sources were inadequate to address the needs of all the households. The low-lying areas in the island villages were inaccessible due to heavy rains and waterlogging, even 10 days after the cyclone (28/10/2013). In Sanpatna, initially three thousand people were evacuated and sheltered in the cyclone shelter three days prior to the landfall. Twenty families continued living in the cyclone shelters for a month.²¹⁸ The Panchayat and local leaders arranged for drinking water and cooked food for a few days during the emergency period, but there were no provisions for cooking and storing food, drinking water and sanitation in the cyclone shelter.²¹⁹ Since

²¹⁷ Focus group discussion- Haripur island – 8th November 2013

²¹⁸ Field visit (Transect walk and FGD): 20-10-13, Sanpatna village

²¹⁹ Field notes (FGD): 22-10-13 Gabakunda distribution

their homes were destroyed, they lived in cyclone shelters without separate facilities for women and children.

Women faced challenges of security and privacy in the shelters, and also during bathing and open defecation.²²⁰ It was difficult for women to maintain personal hygiene and change menstrual clothes due to lack of privacy and space. Women continued to fulfil essential household duties such as water collection, storage, cooking, and supporting livelihood functions. They were responsible for collecting water, in jerry cans, paint buckets and jars (Image 6.10). In Balasore, women and adolescent girls collected 4 buckets of water during each round of water collection (for a household consisting of 6-8 members).²²¹ In Brahmapur, there were separate water facilities for lower caste households, who were not allowed to bathe and wash in the communal ponds.²²² In Padanpur, the poor, low caste and landless families survived on daily wage labour, together with poultry and cattle rearing, which limited their financial capacities to purchase soap, water purification tablets or sanitary pads.

6.2.4 Improved WaSH situation

Agency support in Odisha led to improvements in WaSH facilities after the disaster. The government deployed mobile water tankers for the cyclone-affected populations in the inland villages. However, the interior, remote villages and islands were ignored. Agency A provided emergency WaSH support, and addressed longer-term WaSH needs by rehabilitating handpumps and constructing shared latrines.

In the villages there were differences in agency inputs (See Table 6.3).²²³

Table 6. 3: Immediate water supply measures by Agency A (October – December 2013)

²²⁰ FGD (women)- Arakhakuda field visit 11-02-14

²²¹ FGD (women)- Gombhoria field visit 03-03-14

²²² FGDs – Brahmapur Distribution– 05-11-13

²²³ Document: Project Matrix update, 28 December 2013 (These are proposed numbers in the budget approved by ECHO)

Village Names	Chlorination of hand pumps	Dewatering of open wells	Rehabilitation of handpumps	Provision of Vestagaard communal water filters	Household water filters
Sanpatna	55	1	2	3	277
Arakhakuda	269		4	6	-
Brahmapur	85	1	0	2	115
Khirisahi	17	1	0	1	272
Padanpur	3	1	2	-	
Pirosahi	0		0	1	
Gopinathpur	12	1	3	1	5
Sahadevpur	0	0	0	-	
Chadanamkhana	0	0	1	-	28

In Balasore, WaSH support was limited based on perceived needs and programming decisions. In Chadanamkhana, all the pre-existing water facilities were lost due to erosion. Agency A installed an emergency hand pump in October 2013, which was still being used by 28 households six months after the floods (Image 6.11).



Image 6. 11: Sole communal hand pump and bathing facility for 28 households provided by Agency A
(Image: Chadamankhana, 03-03-14)



Image 6. 12: Household candle water filters (Image: Sanpatna, 28-01-14)



Image 6. 13: Communal Vestagaard filters installed immediately after the cyclone (Image: Sanpatna, 15-11-13)



Image 6. 14: Shared family latrine (Image: Gopinathpur, 05-02-14)

In Puri, Agency A undertook rehabilitation of water sources in Gopinathpur, Arakhakuda and Sanpatna villages. The artesian wells were fitted with regulators to control the water flow. The water treatment measures included provision of water filters and chlorine tablets. The affected villages in Puri were provided with Vestagaard communal water filters, while household candle water filters²²⁴ were provided to targeted families in Puri and Chadanamkhana in Balasore (Images 6.12 and 6.13). Vestagaard filters were immediately deployed after the cyclone for 3 months. However there were complaints of slow discharge of water due to improper maintenance, damage to the filters and turbid water conditions. The candle water filters were reported as one of the most useful items in the post-distribution monitoring (PDM) surveys.²²⁵

For addressing open defecation practices, agency A installed six shared family latrines in Gopinathpur, along with hygiene promotion approaches (Image 6.14). Nevertheless, people were found to prefer open defecation due to cultural attitudes, despite awareness generation of the benefits of using latrines.²²⁶

Mrs O2 (27, F) stated,

*"..using the communal latrine is easy, because it is behind our home, and shared by our neighbours. But it is inconvenient to clean and maintain it because after use nobody cleans, I am responsible for bringing water and flushing and cleaning the toilet."*²²⁷

Meanwhile Mrs. O3 (38, F), mother of 4 children in Gopinathpur village, confessed,

"Honestly, I continue to defecate behind the bushes, once it gets dark. The central location of the toilet makes me uncomfortable because people can find out and its very

²²⁴ Water is poured into the upper of two container and flows through a candle situated in the bottom. Once the water has passed through the candle, it is collected in the lower container. This system both treats the water and provides safe storage until it is used.

²²⁵ Field Notes: FGD (women and children) Chadanamkhana 04-02-14

²²⁶ Field notes: PHP training, Puri: 28-02-14

²²⁷ Household Interview: O2, Gopinathpur 28-01-14

uncomfortable, I suggest my children to use in the dark with the solar light, but I prefer going in the open because I am used to it.”²²⁸

In contrast to the improved sanitation in Puri through agency support, households in Gombhoria continued using self-built latrines (Images 6.15 and 6.16).²²⁹ The latrines were built with locally salvaged materials, and temporary pits, and were used during the night by women and children. The men preferred open defecation and suggested this was to prevent faster filling up of the small pit.²³⁰ The damaged facilities were used without proper repairs or restoration due to lack of adequate funds, or financial support by agencies. It was observed that the structures were risky, and accident-prone for children and the elderly or disabled. Women and children were open and motivated towards using latrines.

Ms O4 (14F), from Chadanamkhana was living in a temporary shelter made of plastic sheets after the floods. Due to erosion, her family had lost their land, farms and handpumps. She says:

“We use toilets for doing our business in school and I prefer that. Latrine is better than going in the open. If I go out in the open people see me and I don’t feel safe sometimes. Nobody will find out if I go to latrine in my own home.”²³¹

²²⁸ Household Interview: O3, Gopinathpur 28-01-14

²²⁹ FGD: Gombhoria, 03-03-14 or Interview: LA-8 15-02-14

²³⁰ Household Interview: O5 Gombhoria 03-03-14

²³¹ Household interview, - O4 Chadanamkhana, 03-03-14



Image 6. 15: Self-built latrines in Gombhoria (Image: 03-03-14)



Image 6. 16: Self-built latrine in Gombhoria (Image: 03-03-14)

6.3 Community Post-Disaster recovery

6.3.1 Changes at the community level

The post-disaster recovery changes, particularly in WaSH in Puri and Balasore are summarised in Table 6.4. The time periods are listed below:

5. t-1 Prior to the floods – pre-2013 situation
6. t-2 Emergency phase during the cyclone in 2013
7. t-3 Early recovery phase during the 6 months following the disaster.

Agency A undertook repair and rehabilitation of communal water sources (Image 6.17), and trained the user group members (members from 4-5 neighbouring households) for repair and maintenance of the facilities in Gopinathpur, Sanpatna and Arakhakuda. For structural resilience against future floods and water inundation, the handpumps were raised above previous flood levels, using concrete aprons and drainage.



Image 6.17: Rehabilitated tube well and bathing facility (Image: Gopinathpur, 28-02-14)

Table 6. 4: Changes in WaSH practices in Puri and Balasore villages (author's interpretation)

Aspects	Sanpatna			Brahmapur			Gopinathpur			Chadanamkhana			Gombhoria		
	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
Water supply	Tube well	Inundated tube wells	Raised TW	Artesian wells	Open wells	Disinfected TW	TW, Well	Damaged TW	Raised TW	Private hand pump	River	One communal Hand pump	Ponds and tube well	Communal TW	Raised hand pump
Treatment	None	No	Communal and HH water filters	Cloth	No	Water filter	No	No	Water filters, chlorine tablets	No	No	Water filters	No measures	No	Water filters, chlorine tablets
Defecation	Open	Open	Communal latrines	Open	Open	Communal latrine	Open	Open	Communal latrine	Open defecation	Open	Open defecation	Open defecation	Open	Private kaccha latrines
Hand washing	No	No	Yes	No		Yes, ash	No	No	Yes, soap	No	Yes	Yes, with ash	No	No	Yes, with soap
Bathing	Well	No	Pond	Pond		Ponds	TW	Ponds	Bathing cubicles	Near the hand pump	River	Bathing space in Gopinathpur	Near the hand pump	Pond	Intermittent piped water supply, ponds

Community members continued to practice open defecation despite awareness of the risks. In the coastal and island villages, the different groups were reluctant to use shared latrines due to issues of maintenance and sanitation practices.²³² In the mainland villages, owing to densely populated settlements, households were keen to use agency-built latrines for privacy.²³³ Agency A had installed a hand pump near the latrine in Gopinathpur, so that users were able to collect water for anal-cleansing. Contrastingly, in Gombhoria, motivated communities used self-built latrines, in the absence of external support.

In the inland villages, handwashing stations were set up, where soaps were left hanging in fishing nets, as a visual reminder for handwashing and also lasted longer as it drained away surplus water.²³⁴ In the coastal villages, the fishing communities could not afford soap, but practised hand washing with ash and banana leaves.²³⁵ Ponds and lakes were frequently used for bathing. In Gopinathpur, women used bathing units provided by Agency A.²³⁶

6.3.2 Community priorities for recovery

This sub-section reports findings from the priority ranking exercises undertaken during FGDs presented in Table 6.5. Within the two districts the priorities for communities during recovery varied across the villages in Puri and Balasore. The priorities depended on the damages incurred, the type of disaster, geographical location and socio-economic conditions. Based on the typology of the villages, Table 6.5 presents the priorities listed in the coastal villages along Chilka lake and island villages within Chilka and the two riverine villages – Chadanamkhana and Gombhoria. The fishing villages along the coast and islands within Chilka lake Puri had lost their kulcha houses and livelihood assets such as fishing nets and boats due to the cyclone. They prioritised rebuilding their houses, but also restore livelihood assets so that the household income can be invested in other recovery priorities.

²³² FGDs: Gopinathpur 13-02-14 and Gombhoria 04-03-14

²³³ FGD: Gopinathpur, 13-02-14

²³⁴ Field notes: Gopinathpur 06-03-14, Sanpatna 13-02-14 and Padanpur 13-02-14

²³⁵ FGD: Sanpatna (13/02/2014)

²³⁶ Transect Walk: Gopinathpur (28/01/2014)

Table 6. 5: Community priorities in study villages in Puri and Balasore

	Coastal	Island	Inland	Chadanamkhana	Gombhoria
Priority #1	Food security	Repair boats and fishing nets	Livelihoods support	Shelter	Housing
Priority #2	Income generation – repair boats and fishing nets	Drinking water supply	Drinking water facilities	Livelihood support	Latrine facilities
Priority #3	Housing	Housing	Latrine facilities	Land	Drinking water
Priority #4	Drinking water supply	Health support – disability access	Menstrual health	Stone pitching to prevent erosion	Livelihood support
Priority #5	Latrine facilities	Latrine facilities		Latrine facilities	Health support

The cyclone impacts varied across the villages: in coastal villages Sanpatna and Arakhakuda, kaccha (non-concrete) houses were completely destroyed, and pakka (concrete) houses suffered structural damages. The fishing households in coastal and island villages had also suffered damages to their fishing boats and nets. In these villages, the markets were difficult to access, so the availability of food for the household members was limited. These households prioritised food and income support to restart their fishing. For the fishing households living in kaccha houses the priority was shelter and other basic facilities. In the inland villages in Puri, cyclone had affected the crops and farmlands were rendered salinised. The farming groups prioritised seed support, and irrigation facilities to ensure that their loss in farming income can be regained. On the other hand, in Chadanamkhana, which was affected by riverine erosion households were displaced due to loss of land for homesteads and farming. In this village the community participants prioritised land tenure security and flood and erosion protection works (stone pitching or spurring to prevent erosion). These priorities reflected the longer-term recovery needs, but humanitarian agencies were only involved in initial provision of food and non-food items, emergency shelter provision, and installation of water supply.

WaSH, as a priority was also variously reported across the villages and by the community participants. In the inland villages the houses were relatively less damaged. The FGD participants listed livelihood support and water, sanitation and hygiene needs. In the coastal villages, the fishing

communities gave least priority to latrines because urgent priorities for shelter and livelihood assets were unaddressed.²³⁷ Drinking water and sanitation emerged as a priority depending upon participants' awareness about risks associated with unsafe WaSH practices. Latrines emerged as a priority concern in Gopinathpur and Gombhoria, where the communities had learnt about safe hygiene and sanitation practices during hygiene promotion efforts by Agency A and F respectively. The WaSH priorities were different according to the participants' gender: women participants' prioritised installation of WaSH facilities. They considered this could ease their access and daily responsibilities for water collection and defecation. While the male participants' prioritised productive assets such as shelter and livelihoods for recovery. In Chadanamkhana, the male participants listed resettlement to safe lands for shelter and livelihoods as a recovery priority.

There were differences in the community priorities and those set by the government and humanitarian agencies. The government agencies and NGOs did not address humanitarian and recovery needs in the villages affected by floods and erosion in Balasore, as well as longer-term needs such as protection and resettlement across Puri and Balasore. Agency A prioritised the cyclone-affected Puri and Ganjam districts for recovery support. It had budget for constructing only 25 houses in cyclone-affected Odisha under the ECHO funded programme (See Section 6.5). In WaSH, the government agencies did not cater to the marginalised groups in the coastal and island villages. The WaSH support was limited to disinfection of hand pumps and technical repairs (See Section 6.4).

6.4 Local institutions in Odisha

This section describes the efforts undertaken by local actors including PRIs (Panchayati Raj Institutions), health and education service providers, and local NGO staff (Table 6.6). Agency A involved school and *anganwadi* teachers through games and competitions for students to promote safe hygiene behaviour. The local government actors – Panchayat members, revenue circle officers and village leaders – mobilised communities during the cyclone, disseminated early warning messages, evacuated them to the nearest cyclone- and flood-shelters, and organised emergency

²³⁷ FGDs - Sanpatna (07/03/2014) FGDs in Gopinathpur (13/02/2014), Sanpatna (07/03/2014), and Gombhoria (04/03/2014).

food and water supplies.²³⁸ In Balasore, the local NGO (Agency E) mobilised women's self-help groups (SHGs) to run community kitchens in the relief camps.²³⁹ The pre-disaster preparedness networks in the districts, which consisted of local NGOs and GROs (Grassroots organisations), were activated in preparation for the cyclone. Agency A and local partner NGOs deployed rescue boats and mobilised contingency stocks from their warehouses, such as tarpaulin sheets and hygiene kits. Distribution of emergency kits and running of community kitchens in the cyclone- and flood-affected villages were carried out with the help of local community facilitators, youth leaders and SHG members. The local government agencies – RDD and PRI members - were quick in mobilising food, cash and water supplies to the affected populations in Puri.

²³⁸ Informal conversation: LA -14

²³⁹ Semi-structured interview: LA-8

Table 6. 6: Local actors' response in Odisha and role for long-term recovery

No	Categories	Type	Actors involved	Activities	Challenges
1	Local service providers	Health	ASHA, ANM, traditional midwives	<ul style="list-style-type: none"> - Involved in recovery programming- WaSH training and capacity building - Provision of chlorine tablets and preventive health 	<ul style="list-style-type: none"> - Limited human resources - Difficulties in outreach activities during disasters
		Education service providers	School and <i>Anganwadi</i> teachers	<ul style="list-style-type: none"> - Managing School WaSH committees - Awards for best students in cleanliness awareness of handwashing, nail cutting - First space for hygiene education 	<ul style="list-style-type: none"> - Limited resources in schools affected by disasters themselves - Primary focus is on education - Lack of maintenance of school facilities
2	Local actors	Government bodies	Circle office, line departments and other relevant agencies, the Panchayat	<ul style="list-style-type: none"> - Relief provision, - Damage assessment and compensation with the district administration - Subsidies for housing, handpumps and latrines - Land allocation for embankments 	<ul style="list-style-type: none"> - Limited role and mandate for recovery solutions - Lack of coordination and guidelines for recovery between line departments - Unclear role in longer-term recovery
		Youth facilitators	Agency –recruited local paid-volunteers	<ul style="list-style-type: none"> Trained for supporting programme implementation - Relief distribution and Hygiene promotion, - Household surveys and monitoring - Construction and Facilitation skills 	<ul style="list-style-type: none"> - Limited role within programme - Lack of appropriate skills and knowledge of public health promotion or no prior experience of working in disaster affected areas - Time bound presence
3	Community groups	Community-Based Organisations	Disaster preparedness networks	<ul style="list-style-type: none"> - Training in DRR - Search and rescue, shelter management committees - Village task forces (TFs) 	<ul style="list-style-type: none"> - Limited funding and informal organised efforts in responding to disasters, no clear role in longer-term recovery
4	Local NGOs	Development and DRR	Agencies D and F in Puri, E (Balasore), G (Ganjam)	<ul style="list-style-type: none"> - Prior experience of 1999 super cyclone - Humanitarian objectives and relief distribution - Partnerships and networks for response 	<ul style="list-style-type: none"> - Funding for longer-term recovery programmes - Expertise and mandate for WaSH and resilience programming

6.5 Government Agencies' response

This section describes the Government of Odisha (GoO) WaSH response, relief and rehabilitation measures and recovery programmes, using data from agency reports, newspaper articles, emails and meetings.

6.5.1 WaSH response

The government data indicated that Cyclone Phailin had damaged 3089 piped water supply schemes (PWSS) but no comprehensive information was available on the impact on the sanitation infrastructure (Mommen et al. 2014).²⁴⁰ Rural Development Department (RDD) organised 234 tankers, 345 mobile vans, 29 lakh water pouches and deployed generators to restart piped water supply in 18 affected districts through the Rural Water Supply and Sanitation (RWSS).²⁴¹ RDD response included disinfection of 58,100 tubewells and distribution of 1,661 (25-kg) bags of bleaching powder. The financial costs included INR 122.34 lakh for emergency drinking water and additional INR 27.61 crores for repairing 3040 rural piped water systems and 1,62,170 damaged tubewells.²⁴²

Despite above measures, sanitation facilities were lacking in the cyclone shelters, and in the affected villages. There were gaps in outreach measures by the RDD as they had limited capacities in the face of multiple disasters. Self-employed mechanics (SEMs) were deployed for hand pump disinfection, but they could not access the remote, waterlogged and isolated villages.²⁴³ Similarly, mobile water tankers catered to the roadside villages and ignored the farthest hamlets and island villages.²⁴⁴ During a RDD meeting for INGO coordination in WaSH support, it emerged that subsequent rains and floods had stretched the Department's limited resources, and greater flexibility was needed in the humanitarian WaSH response for the changing conditions and the local context.²⁴⁵ RDD officials

²⁴⁰ In Odisha, drinking water and sanitation falls under the mandate of Rural Development Department (RDD). The Rural Water Supply and Sanitation (RWSS) is the implementing agency under RDD for rural water and sanitation sector. The Odisha State Water and Sanitation Mission (OSWSM) was constituted in 2002 for providing overall policy guidance for community led and participatory water supply and sanitation projects.

²⁴¹ Orissapost Oct 23 Drinking water supply for 18 districts in state

²⁴² Orissa post October 23rd, 2013 Drinking water supply for 18 districts in state

²⁴³ Field notes: PHP meeting – 2 November 2013 – Brahmapur and Khirisahi challenges

²⁴⁴ Field visit Brahmagiri block, February 2014

²⁴⁵ Email: Minutes of meeting 24 October 2013 Unicef

encouraged NGOs to undertake disinfection of water sources, water treatment, storage and testing, (re)construction of water sources and raised platforms, hygiene promotion among communities and schools, assessments and trainings.²⁴⁶ Issues pertaining to WaSH response raised during the meeting were:²⁴⁷

- Disinfection of water sources: It was decided that INGOs should focus on disinfection of private water sources and wells, while RDD disinfected the government-installed tubewells. All sources, including ponds, should be disinfected, but messages should be given to avoid drinking pond water.
- Household versus community-level focus: RDD encouraged NGOs to focus on households while government could focus on the community level for hygiene promotion.
- Sanitation options: The prevalent open defecation practice, near water sources, was recognised as a major health threat; there was a need for stronger evidence for the suitability and appropriateness of trench toilets in the context of Odisha. During the meeting, RDD encouraged sharing of experiences by agencies on trench toilets and sanitation promotion approaches to continue beyond the emergencies.
- Tankers, pumps and treatment units: RDD welcomed the deployment of tankers, generators/ solar pumps by INGOs to support supply, treatment and distribution of water.

Thus, it emerged that the GoO was challenged by the multiple disasters, and pre-existing lack of sanitation development in Odisha.

6.5.2 Immediate relief and rehabilitation measures

GoO exhibited dedicated efforts in saving lives through preparedness during the 2013 cyclone compared to the 1999 super cyclone that claimed nearly 10,000 lives (Dash 2013). The World Bank applauded the success in preparedness and evacuation measures through Cyclone and Flood Shelter Management and Maintenance Committees, better weather forecasting, near-accurate predictions, better disaster preparedness and communications (World Bank 2013). The Odisha State Disaster Management Authority (OSDMA) coordinated relief, restoration, and reconstruction activities after

²⁴⁶ Email: Minutes of meeting 24 October 2013 Unicef

²⁴⁷ Email: Minutes of meeting 24 October 2013 Unicef

Cyclone Phailin. The Revenue and Disaster Management Department (R&DM), Odisha is in-charge of implementation of the Odisha Relief Code (ORC) during disasters (Government of Odisha 1996). Odisha Relief Code, the only existing disaster policy document for Odisha, explicitly mentions ‘sanitary arrangements’ just once in the context of restoration activities post-disasters.

The Central government offered relief assistance of INR 1000 crores to the state to deal with the aftermath of the cyclone. From the Prime Minister’s National Relief Fund an ex gratia amount of INR 2 lakh each, to the next of kin of deceased, and INR 50000 each for the injured was announced.²⁴⁸

The line departments sent the damage reports and list of beneficiaries entitled to government support for rehabilitation.²⁴⁹ In Balasore, it emerged that the district administration faced challenges during household damage assessment. During beneficiary listing there were differences due to the political mandates of the *sarpanch* (village headman) and the ward members for nominating households for compensation, and confusions resulting from multiple assessments undertaken by local Panchayat and Central assessment teams.²⁵⁰ There were reports of politicisation of relief aid because the local Panchayats, who implemented the government schemes, used this opportunity to gain support from their vote banks.²⁵¹

6.5.3 Recovery and reconstruction initiatives

The OSDMA played an active role during the rehabilitation by taking proactive measures in resource mobilisation, database management, and coordination with different departments and affected districts, donors and NGOs. In Odisha, the World Bank funded and supported a \$1.45 billion programme in the cyclone-affected districts of Ganjam, Puri and Khorda for building disaster-resilient houses, improving slums and city infrastructure, and strengthening disaster risk management capacities.²⁵² Additionally, \$313 million funds were pledged by the World Bank and the Asian Development Bank: \$55 million for construction of 162 cyclone shelters, \$152 million for reconstruction of damaged households within a 5 km radius of the coastline, and slum redevelopment.²⁵³ These proposals did not factor WaSH interventions into the resettlement plans.

²⁴⁸ News article Orissa Post: Nov 9 PM announces interim relief of ₹1000 crores

²⁴⁹ News article Orissa post: Oct 28th Focus shifts to long-term rehab

²⁵⁰ District official meeting notes 19-02-14

²⁵¹ Semi-structured Interview: LA- 9, 19-02-14

²⁵² <http://www.worldbank.org/en/news/press-release/2014/07/14/india-and-world-bank-sign-usd-153-million-agreement-for-odisha-disaster-recovery-project>

²⁵³ Orissapost Nov 13, WB-ADB joint mission declares \$313 million aid

During the stakeholder consultation meetings, there were discussions about approaches for sanitation improvement, but the issue was sidelined, due to the limited time available for discussion, and the lack of technological solutions and political will for implementation during reconstruction.²⁵⁴

6.6 Humanitarian Agencies' response

This section presents humanitarian and recovery WaSH interventions by Agency A and partner NGOs after the cyclone Phailin and floods in Puri and Balasore. It also describes the integrated approaches and consortium-based approaches in Odisha.

6.6.1 Agency A Response Programme

Agency A had different local partners, donor support and varying programme duration in the affected districts (Table 6.7).

Table 6. 7: Agency A Cyclone and flood response 2013-14, Odisha

District	Local Partner	Donor	Programme duration
Puri	Agency D and F	UK AID, ECHO	12 months
Balasore	Agency E	UK AID	3 months
Ganjam	Agency G	UK AID, ECHO	12 months

The immediate evacuation, relief support and response measures were rapidly mobilised as the organisations had set up preparedness initiatives after the 1999 super cyclone. The local NGOs participated in district coordination meetings with the government, and activated a pre-disaster preparedness network (PDPN) of NGOs to evacuate communities living along the coastline. Agency A deployed contingency stocks, mobilised water filters and chlorine tablets, and deployed assessment teams and human resources immediately. Agency A also granted approvals to its local partner NGOs for spending contingency funds for evacuation and purchase of food, soap, and tarpaulins in Puri, Ganjam and Balasore.²⁵⁵

Agency A and its local partners provided WaSH support in two phases after the cyclone and floods – immediate emergency water provision and treatment, followed by rehabilitation of water sources

²⁵⁴ Field notes: 12-11-13 World Bank, OSDMA office & INGOs stakeholder consultation meeting, Bhubhaneshwar

²⁵⁵ Briefing meeting notes: 19-10-13, Bhubhaneshwar

and provision of shared sanitation facilities during the early recovery programme. Regular assessments and technical training programmes guided the WaSH interventions. The core programme staff and deployed experts from international affiliates undertook the emergency WaSH needs assessments in Puri (7th – 13th November).²⁵⁶ The assessment findings highlighted structural damages of water sources, degradation of water quality due to the cyclone, inadequate water supply causing over-reliance on existing inundated sources, and risky practices of water collection, transport and storage.

The water component of the programme was designed with the objective of providing safe water supply and hygiene messages on safe water handling, along with disinfection of contaminated water sources and provision of new communal water facilities (based on need and provision of water filters at the communal and household level).²⁵⁷ Agency A deployed water tankers for a week, and installed Vestgaard filters for communal water use and treatment in Puri, along with formation of user committees, demonstrations and training.²⁵⁸ The filters were inappropriate to the local conditions: turbid water affected the filter technology, resulting in clogging of the filters and slow output rate.²⁵⁹ Agency A also deployed teams of hand pump mechanics and public health promoters for chlorinating and repairing tubewells, and generating awareness on the risks of consumption of contaminated water.²⁶⁰ Refresher training programmes were undertaken on water treatment and hygiene promotion in Puri (28th October 2013).²⁶¹ Subsequently, 800 tubewells in Puri (25th October 2013 – 31st November 2013) were chlorinated.²⁶²

During early recovery, WaSH measures included installation of communal handpumps, tube wells, communal latrines and bathing cubicles, rehabilitation of pre-existing water sources and community pond generation through CFW projects in the study villages (Table 6.8). Programme support in Balasore was discontinued after the emergency phase.

²⁵⁶ Email: Meeting - Summary of findings - WaSH Joint Assessment - Phailin Odisha

²⁵⁷ Informal conversation – WaSH meeting, Puri 28-10-13

²⁵⁸ Document – Agency A Water tankering strategy paper, 19-10-13: Distribution plan was finalised after permissions from the Ganjam district administration for 30 litres water per day per household for each targeted village will be provided for 7 days after water quality tests. Accordingly, 18,500 litres were distributed catering to 276 households in 7 villages

²⁵⁹ Fieldnotes: Staff Meeting, 18-11-13, Puri

²⁶⁰ Email: Minutes WaSH INGO cluster meeting + immediate action in the field, 22-10-13

²⁶¹ Email: Field update 26-10-13

²⁶² Email: Field update 26-10-13

Table 6. 8: WaSH measures in Odisha as on 21st February 2014²⁶³

Village	Raised pump	Pond	Rehabilitation of pumps	Communal latrines	Bathing
Sanpatna	0	1		12	
Arakhakuda	2		4		
Brahmapur		2		23	6
Khirisahi					
Padanpur		1			3
Pirosahi		0			
Gopinathpur	1	1	1	6	4
Sahadevpur					
Chadanamkhana	1				

Based on the consortium proposal, a detailed budget activity sheet for Ganjam and Puri for implementation (January – March 2014) included structural interventions in WaSH, health promotion, livelihoods and shelter. Agency A's proposed numbers in WaSH interventions were as follows.²⁶⁴

1. Rehabilitation of existing water sources with aprons and soakpits (100 nos);
2. Raising open wells and well cover and retrofitting (30 nos);
3. Installation of handpumps (Popular-VI), aprons and privacy screen (50 nos);
4. Installation of latrines and bathing complex (100 nos);
5. Distribution of toolkits for repair and maintenance (20 nos), and training (4 nos); and
6. Water testing and chlorination of handpumps and open wells (200 nos).

To contextualise Agency A's WaSH programme within proposed budget and assessed needs, a consultant engineer was deployed to undertake a detailed WaSH assessment. This included supporting, training and supervising the PHE and PHP teams for developing and designing water and sanitation interventions based on proposed actions.²⁶⁵ It was proposed that certain activities could be modified to reflect the community practices:

²⁶³ Document: Agency A – Project Matrix – Puri, 21-02-14

²⁶⁴ Document: Agency A ECHO-funded recovery programme Budget, January 2014

²⁶⁵ Email: Expert support in PHE construction – Odisha Response – 14-01-14

“As per the budget, the latrine and bathing complex are supposed to be constructed together. But since people are living at their permanent dwellings, it would be better to construct individual toilets shared by two to three families instead of community toilets. In this case, it won't be good to have bathing complex attached to latrines. The community habit here is to take bath on the water source (hand pump or open well). So I would recommend to have latrine and bathing space separately...The privacy screen around the new or rehabilitated existing hand pump and/or open well, will serve the purpose of bathing space.....recommend some variations like height of the platform....this is flood prone area and the height of the platform needs to be at least 2 ft. Also if we are proposing these platforms to be used as bathing space by providing the privacy screen, then its dimensions should be 3 x 2 m. For other platforms dimension could be 2 x 2 m”²⁶⁶

The feasibility and requirements of rehabilitation of water sources and shared latrines were studied in Sanpatna, Arakhakuda, Haripur, Padanpur and Gopinathpur. Based on space, water level and duration of stay of communities in the particular sites, retrofitting of ‘Popular 6’ handpumps, open wells and dug wells was suggested for providing raised platforms and aprons, soak pit and well cover.²⁶⁷ The artesian wells were fitted with regulatory valves. Sanitary and technical surveys, database of the households using the source and community resolutions and approval letters from government officials were obtained.²⁶⁸ Sanitary surveys and water testing were mandatory before repairing the structures because of the high iron content in the region; water quality tests for bacteria (+/-), fluoride (+/-) and arsenic (+/-), total dissolved solids (TDS), pH (how acidic/basic water is), turbidity, and odour were recommended.²⁶⁹ A ready reckoner for field-staff and technicians was developed that described the procedures.²⁷⁰ The international personnel and the RTE team observed that the WaSH field team lacked necessary expertise and knowledge of such procedures.

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²⁶⁶ Email: Field observations – 14-01-14

²⁶⁷ Email: WaSH updates from Puri + points regarding PHE – 25-01-14

²⁶⁸ Email: Tracking sheets: WaSH constructions - materials, labour, GPS, HH and gender segregated data – 25-01-14

²⁶⁹ Email - Format: Water quality surveillance reporting format - common to all, 01-03-14

²⁷⁰ Document –Photo presentation - Dug well rehabilitation: photo presentation on the process.11-02-14

²⁷¹ Field Notes: RTE Debrief workshop, Puri 24-02-14

Agency A had provisions for 50 shared latrines in Puri, each of which will be shared by 3-4 households. During the study in Puri, as of 7th March 2014, 4 latrines in Gopinathpur, 18 in Brahmapur (including a disabled-friendly latrine designed with a ramp), and 8 latrines in Sanpatna were constructed using bamboo, tarpaulin sheets and plastic *Nagmagic* squatting slabs. The RTE team suggested replacing tarpaulin sheets with bamboo mats for the latrine superstructure as the sheets were susceptible to heavy winds in the coastal areas (Image 6.18).²⁷²

The latrines were constructed after determining the feasibility of shared latrines through community consultations, understanding the inundation levels and socio-economic factors for sharing. The records and procedures were maintained for number of households using latrines, male and female, and children No-Objection Certificates (NOC) were taken and community resolutions were passed on agreement on the user groups and hand over of cleaning materials – harpic (disinfectant), *jhadoo* (brooms) and buckets for storing water for anal-cleansing.²⁷³ The programme staff undertook consultation with user groups and regular monitoring visits to inspect the facilities, to understand household use of latrines and challenges faced by members.²⁷⁴ The latrines were provided with fences, and new handpumps near the latrines (for anal-cleansing and flushing), and hand washing stations to encourage use of latrines.²⁷⁵

²⁷² Field Notes: RTE Debrief workshop, Puri 24-02-14

²⁷³ Email: Toilet construction 25-01-14

²⁷⁴ Gopinathpur - Household monitoring visit – 04-02-14, FGDs: 13-02-14, and 07-03-14

²⁷⁵ Email: Distribution of cleaning materials +Document – Village wise cleaning material – 26-01-14



Image 6. 18: Construction of semi-permanent family latrines in Puri (Image Source: Agency A)

For PHP, Agency A focused on generating awareness and changing hygiene behaviour. The messages revolved around solid waste management, water quality, sanitation, and hygiene practices. Under the ECHO-funded programme, Agency A had a budget for undertaking mass campaigns, village cleanliness drives, solid waste management, printing and displaying IEC materials, and capacity building. The key hygiene messages related to hand washing, water handling, food handling, menstrual hygiene, solid waste management and use of sanitation practices.²⁷⁶ In the aftermath of diarrhoeal diseases in Arakhakuda, agency A immediately set up Oral Rehydration Salt (ORS) booths, demonstrating how to prepare ORS and prevent children from falling sick through consumption of safe water. Chlorination of water sources, setting up communal Vestagaard filters and concentrated hygiene promotion efforts in local language were also undertaken.²⁷⁷ The team organised village

²⁷⁶ Email – printing of IEC – 27-01-14

²⁷⁷ Email: Diarrhoea outbreaks in Puri and Ganjam, 4-11-13

meetings and public health campaigns for disseminating hygiene messages on handwashing before eating, covering food and water containers and maintaining environmental cleanliness.²⁷⁸ Through hygiene promotion efforts in Puri and Balasore, changes were reported,

“There was good awareness about hand-washing at critical times. 100% of respondents shared that they wash hands before eating. [...] About 96% wash hand[s] before cooking and 4% do not wash hands before cooking. 93% respondents wash their hands before feeding whereas 99% wash their hands after toilet. It also came out that 98% respondents wash their hands after cleaning their infant after defecation.”²⁷⁹

The female members in Gopinathpur found the newly installed bathing units, near the water sources, provided them with privacy, with additional space for washing clothes and taking wastewater drainage away from the water source.²⁸⁰ In solid waste management, village cleaning drives were undertaken for clearing the debris and gathering all the waste generated in the village. Then the households were encouraged to assess the garbage and solid waste generated by each household and disposal practices. This was helpful to trigger demand generation for garbage disposal bins.²⁸¹ In Puri, school WaSH activities were undertaken, through water, sanitation and hygiene committees.²⁸² The students participated in activities and demonstrations, where they were encouraged to learn and sing songs narrating the importance of hygiene and health. Hand washing after the midday meal was encouraged in school, and on Mondays inspection of nails was undertaken.²⁸³ In Arakhakuda, students participated in a village rally on cleanliness and challenging open defecation practices in the village.

6.6.2 Integrated approaches in recovery

Agency A included shelter and livelihoods interventions – cash transfers and supporting vulnerable livelihoods of farmers and fishermen in the recovery programme. Cash transfers were provided either as unconditional, or in lieu of cash for work (CFW), to selected households. The CFW projects

²⁷⁸ Staff training discussion: 12-11-13, Puri

²⁷⁹ Document: KAP baseline Report – February 2014

²⁸⁰ FGDs: 07-03-14 Gopinathpur

²⁸¹ Staff Meeting notes – PHP feedback – Solid waste management – 07-02-14

²⁸² RTE discussions, Puri office – 12-02-14

²⁸³ RTE discussions, Puri office – 12-02-14

at the village level were determined through participatory exercises such as hazard and social mapping, which provided scope to integrate community needs and priorities including water supply (Table 6.9). In each village primary and secondary activities were identified that were undertaken within 60 days by the participants. CFW projects included pond generation, clearing and regeneration in Brahmapur, Khirisahi and Padanpur.

Table 6. 9: Integrated activities in cash for work (CFW) and WaSH

Villages	Primary CFW activity/site	Secondary CFW activity/site
Sanpatna	Boat stand + Net stand	Road laying
Arakhakuda	Laying of roads	Levelling cyclone shelter grounds
Brahmapur	New pond generation	Raised platform for floods
Khirisahi	Debris cleaning near pond	Laying of roads in the island
Gopinathpur	Laying roads	Clearing pond
Padanpur	Pond regeneration	Access road laying
Pirosahi	Levelling <i>madarasa</i> ground	Laying road above flood levels

Arrangements were made for providing basic facilities at the work-site including drinking water supply (or Vestagaard water filter), food/biscuits for children, hoes and bamboo baskets for earth work (1 hoe: 3 basket), work-shade and urinals.²⁸⁴ At the end of 60 days, the participants requested Agency A for continuing the CFW project and provide additional days for work and income support.²⁸⁵ This support could not be conceded by humanitarian agencies, as continuing the project beyond the stipulated period required additional finances and donor approvals. The projects were unable to link with government schemes because the schemes were dysfunctional in the villages. In a survey conducted by Agency A to understand the rural employment provided under the MGNREGA scheme, it was found that no work had been undertaken in the past 6-7 years in Puri.²⁸⁶ In WaSH, efforts were taken to link WaSH with the government schemes through training and capacity building. The local partner Agency D facilitated training on Nirmal Bharat Abhiyan (NBA) for village representatives, WaSH teams and volunteers, along with community based water purification.²⁸⁷ 'Nirmal Bharat Abhiyan' (NBA), formerly known as Total Sanitation Campaign (TSC), is a flagship

²⁸⁴ Email - Mandatory requirements - CFW and UCT documentation and Work site facilities, 16-01-14

²⁸⁵ FGDs Gopinathpur (07-02-14), Sanpatna (13-02-14), Arakhakuda (07-03-14) and Padanpur (13-02-14)

²⁸⁶ Survey database: MGNREGS survey, February 2014

²⁸⁷ Email: One day orientation on Nirmal Bharat Abhijan (NBA)

government scheme for sanitation and cleanliness. The programme was re-launched with the objective of accelerating the sanitation coverage in rural areas so as to comprehensively cover the rural community.²⁸⁸

However there were challenges in the functioning of the government schemes. An agency official commented:

“Sometimes establishing programmes and government schemes linkages are so difficult, because we assume that peace-time development programmes and government schemes are functional, so once the programme ends, we just provide information on government schemes and expect that our models will be scaled up and replicated. We need to account for system inefficiencies and factor them into programme design. Our challenge has been scaling up of our models, and systematisation.”²⁸⁹

Therefore, the humanitarian programmes face challenges in establishing linkages with the government schemes and development actors during recovery.

6.6.3 Consortium-based approaches in Odisha

In Odisha, the international donors, UK AID and ECHO, invited international NGOs and humanitarian agencies to bid for funding through consortium models. There were two consortia each for both donors, with at least 5 participating agencies in each. The UK AID donor assessment started on 19th October 2013, the Rapid Response Facility (RRF) call for proposals was open on 26th October 2013 (Table 6.1). The participating agencies had 36 hours to submit a unified proposal for bidding for the funding, while many agencies were still undertaking assessments and identifying the needs in the affected areas.

There were advantages and challenges of working in a consortium. Agency A official commented:

²⁸⁸ This will be achieved through renewed strategies and saturation approach, with a view to create Nirmal Gram Panchayats with the following priorities: 1) Provision of IHHL to both BPL and Identified APL HHs within a GP, 2) GP with access to water to be taken up. Priority should be given to GPs having functional piped water supply, 3) Provision of sanitation facilities in Government Schools and Anganwadis, 4) Solid and Liquid Waste Management (SLWM) for proposed and existing Nirmal Grams, 5) Extensive capacity building of the stake holders like Panchayati Raj Institutions (PRIs), 6) Village Water and Sanitation Committees (VWSCs) and field functionaries for sustainable sanitation and 7) Appropriate convergence with MNREGS with unskilled man-days and skilled man-days

²⁸⁹ Semi-structured Interview – INGO professional: INGO-3

“There are pros and cons of working in a consortia: It gives you weightage of bringing up a programme at a large scale, 2-3 big organisations come together to address needs and cover a large area; sharing of skills, competencies, and leads to cross-fertilization of skills and ideas; donors are attracted towards working in consortia – in terms of outreach and enhanced coverage and visibility.”²⁹⁰

Agency CA official commented:

“There is lot of value of working in consortia, I would rate it on a positive side. Obviously there are flip sides. Not each member may have the same enthusiasm and same spirit while working together. In Assam there were three members, now in Odisha there are five, the speed and interest varies. This needs to be further strengthened as a consortium. The problem is speed vs. accuracy, and consensus versus the USP [unique selling point] of each organisation.”²⁹¹

In the UK AID-funded consortium Agency A was the logistics lead – purchasing, warehouse management and distribution for partner agencies. Agency CA was the programme lead – ensured adherence to timelines and qualities, and reporting. More than 21,000 households received emergency kits. The procurement and uniform purchasing caused delays in undertaking distribution, but there were benefits of increasing outreach, scale and financial gains in the consortium-model. There were two consortia operational in the UK AID and ECHO programmes led by Agency CA (UK AID lead agency), Agency AA (ECHO lead agency) and Agency STC (lead agency for both UK AID and ECHO). There were challenges in ensuring the smooth running of the programme through consortium members:

“The complications of working in a consortium are that it is process heavy; transaction costs are high; decision making in a consortia also takes time. It leads to clashes of ideas, although initially agencies come together, the ways of working of each organisation is different. The

²⁹⁰ Semi-structured Interview – INGO professional: INGO-3– November 2013

²⁹¹ Semi-structured Interview – INGO professional: INGO-4– May 2014

*fastest consortium member's efforts get dragged down by the slowest member agency in terms of delivery.*²⁹²

A participating agency official echoed there were differences in agencies ways of working:

*"All agencies did not have similar capacities. Some are experts and have strong core humanitarian principles [...], while others are rights-based, and some others are child-centric."*²⁹³

In Odisha, the consortium approach provided space for collaboration, where agencies could learn from each other through common standards, programming approaches and advocacy. UK AID-funded kit distribution helped in standardising kit items across NGO members. This allowed for agencies to include sanitary cloths and napkins, solar lamps, cooking sets and water filters. The consortium members came together for advocacy through regular joint reporting of achievements and programme outputs, using social networking sites and blogposts to document and share the member agencies' initiatives.²⁹⁴ These initiatives were limited to the programme duration, as the collaboration was donor-specific. The familiarity of the agencies working together was instrumental in facilitating easier coordination during 2014 Cyclone Hudhud and floods that recurred in Odisha.²⁹⁵ The continuity and sustainability of such learning forums needs further investigation.

Decision-making in consortia was a time-consuming process: during workshops, meetings and joint training events, time was spent for streamlining and initiating new processes and formats, instead of focusing on gathering evidence, or community needs, or longer-term approaches.²⁹⁶ The joint training efforts allowed agencies to build expertise in different sectors, but agency interests and mandates limited the extent to which this learning was systematised and institutionalised within each agency. For instance, Agency CA undertook shelter programming and facilitated Shelter 'Training of Trainers' (TOT) for the participating agencies in Ganjam; however Agency A had limited

²⁹² Semi-structured Interview – INGO professional: INGO-3– November 2013

²⁹³ Semi-structured Interview – INGO professional: INGO-4– May 2014

²⁹⁴ <https://phailincyclonerresponse.wordpress.com/>

²⁹⁵ <https://sphereindiablog.wordpress.com/2014/10/09/situation-report-1-flood-and-heavy-rainfall-in-odisha-05th-august2014/>

²⁹⁶ Field notes: Bhubaneshwar, 06-12-13

funding, mandate and capacity to undertake shelter programming. Only 25 shelters were proposed under the early recovery programme by Agency A.

Financial compliance and reporting were complicated procedures. Donor regulations and mandatory conditions and guidelines required that any changes in outputs, expenses and activities were to be reported, and approved by the donor. Six months after the cyclone, reports indicated that there were affected areas that were not covered by any of the consortia member agencies. ECHO froze the livelihood budget-line for all the partners until a justification was given. The participating agencies undertook needs assessments, and justified strategies for meeting the unmet needs of the ignored areas, which was later supported through OFDA (Office of U.S. Foreign Disaster Assistance) funds. There was general consensus during the meetings that agencies had limited and time-bound resources within the ECHO programme to meet recovery needs in the operational villages, so to expand to newer areas 6 months after the disasters was a huge challenge. For Agency A, this posed financial constraints because the livelihood component had commenced, and farmers had received seed support.

The financial audits by donors required papers and signatures for goods received by recipients and community participants for the local projects. The spending on visibility boards and banners displaying donor logos in the villages did not directly contribute to programme sustainability or effectiveness.²⁹⁷ The emphasis on outcomes, gathering sex and gender disaggregated data – for weekly/monthly/quarterly reporting for targeted and reached beneficiaries – were time-consuming. The programmes and monitoring did not adequately assess the implications of quick decisions on targeting in shorter time-periods. Under ECHO guidelines, the cash had to be delivered to the households within 90 days after the programme commenced. This put enormous pressure in rapidly identifying, verifying and disbursement of cash for unconditional grants, and for CFW projects to plan, design, approve and implement community projects.²⁹⁸

The partner agency staff summarised the challenges of consortium-based programming as follows:

²⁹⁷ See <http://www.hapinternational.org/what-we-do/hap-standard.aspx> for more details

²⁹⁸ Semi-structured Interview – INGO professional: INGO-4– May 2014

“We learn from each other; each organisation has their own expertise, mandate, objective. The way agencies do things are also different. In principle it contributes, but when it comes to policy-level work, it is still not coming together, for issues of dam, land, which are larger issues. In addressing humanitarian crises, we are fine, but root causes we have not developed in consortia yet.”²⁹⁹

The consortium-based approaches are a new phenomenon, with contributions from participating agencies, but they need strengthening to maximise the space for collaboration to address longer-term recovery issues.

6.7 Chapter Summary

This chapter described agency interventions – repair and rehabilitation of water sources, provision of sanitation facilities – and household and community WaSH practices. Under learning and knowledge pathway, the chapter studies WaSH technologies deployed by agencies during humanitarian response in conjunction with local knowledge and practices. The exchange of knowledge results in hygiene behavior changes and increased awareness of safe practices in hand washing, menstrual hygiene, safe water collection and storage and use of latrines for defecation. This was achieved through consistent promotion strategies adopted by humanitarian agencies. Agency A and its partner organisations adopted participatory approaches for implementing recovery programme interventions in water supply rehabilitation, cash for work projects and provision of family latrines. Studying institutional pathways showed that government and humanitarian agencies recovery interventions did not match the community priorities. Government undertook immediate relief provision, restoration of water supply, but took a non-interventionist approach in emergency sanitation provision. This approach was mainly because open defecation was rampant in Odisha prior to the cyclone and therefore construction of latrines without appropriate promotion campaign would not be effective. In terms of integration, Agency A adopted exit strategies to link their interventions with existing development programmes., which were not helpful because the government programmes were dysfunctional prior to cyclone.

²⁹⁹ Semi-structured Interview – INGO professional: INGO-1– May 2014

Chapter 7: Discussion

This chapter analyses the empirical findings (Chapters 5 and 6) to address the research questions. I discuss how WaSH and recovery policies translate into practice (Section 7.1); how learning, knowledge and participatory approaches in WaSH during recovery led to action (Section 7.2); and how emergency response was integrated into longer-term development (Section 7.3). I also discuss the challenges of using the conceptual framework (Section 7.4) and the themes emerging from the data, which were not included in the framework – WaSH trajectories, gendered recovery processes and coproduction of knowledge (Section 7.5).

7.1 How can the existing policies in WaSH and recovery be strengthened to incorporate resilience in WaSH? Furthermore, how can these policies be effectively translated into practice?

The government institutions, local actors and humanitarian agencies in Assam and Odisha faced numerous challenges in implementation of WaSH response. The central argument here is that WaSH during recovery remains a critical gap in the existing policies, schemes and programming strategies, and often ignores post-disaster sanitation and hygiene. I argue that an opportunity, which is available during recovery, to instil and sustain changes in WaSH, is often missed by the agencies.

7.1.1 Issues in WaSH measures during Recovery

The existing policies can be strengthened through an understanding of WaSH recovery programmes and the issues faced by the government, local and humanitarian actors during implementation. The governments in Assam and Odisha focused on short-term, relief-centric water supply, ignoring the longer-term recovery needs of the disaster-affected and displaced populations. The government support in water supply and food provisioning was limited to the relief camps in Assam and accessible villages in Odisha. It was observed that the affected populations living in the relief camps, multi-purpose shelters, and villages in Assam and Odisha had inadequate water sources and sanitation facilities to access during recovery. The government measures did not reach out to the remote villages, which were worst hit by floods and cyclones, where the most vulnerable groups had limited access to WaSH facilities (Sections 5.2.2 and 6.2.2). The PHED restored piped water

supply schemes (PWSS) and disinfected spot sources (handpumps and tubewells) along the roads, and townships (Sections 5.5.1 and 6.5.1). The rural areas did not have PWSS, and remained under-served during disasters. In Assam, the line departments (PHED, Health Department and RWSS) mobilised human resources, and distributed chlorine tablets; it emerged that households did not prefer chlorination due to taste and odour issues. Agencies working in recovery could incorporate local techniques of treating water at the household level. These challenged the effectiveness and impact of WaSH relief measures, and hygiene behavioural changes were difficult to sustain without committed longer-term efforts in addressing the attitudinal changes.

The empirical evidence indicates that unsafe WaSH practices – drinking of contaminated water, open defecation practice, lack of handwashing and food and water handling practices – cause spread of water-borne diseases and pose significant public health risks during disasters, as found in the existing literature (Prüss-üstün et al. 2004; Brown et al. 2012). The challenge of continued open defecation, as a development concern, was largely unaddressed in the post-disaster context. In Assam, the PHED restored damaged water sources, but sanitation was least prioritised for recovery from cyclical and recurring floods (Section 5.5). Similarly, in Odisha, sanitation provision was not included in the OSDMA-World Bank reconstruction proposals (Section 6.5.3). The preparedness measures focused on water, as the line departments advocated raised handpumps, undertook stockpiling of water purification tablets, and purchased water treatment units. In both Assam and Odisha, water sources were raised for access during disasters. There were many gaps in the above measures including, lack of financial support to households who bore the cost of raised platforms and lack of technical knowledge for operation and maintenance. The WaSH preparedness measures also lacked a multi-hazard perspective, as different disasters had different impacts on WaSH facilities – cyclones caused structural damages to the WaSH facilities due to storm surge; floods resulted in submergence and inundation causing groundwater contamination; while erosion caused WaSH facilities to be washed away.

Another critical issue emerging out of the empirical evidence suggests lack of attention to local actors and women in WaSH during recovery. The local actors, service providers, and Panchayati Raj institutions (PRIs) implementing the schemes had limited capacities, resources and power (see Table 5.5 and 6.6). In order to sustain behavioural changes post-disasters, the involvement of community

leaders needs to be systematised in hygiene promotion efforts. The PRIs have limited resources to allocate annual subsidies for post-disaster toilet construction and hand pump installation. There is potential to involve the health and education service providers in hygiene education through outreach programmes. However their existing responsibilities in sector-specific roles lacked clear direction for hygiene promotion during recovery. Women faced privacy and security issues due to lack of latrines, difficulties during open defecation and water collection, and problems in attending to menstrual hygiene needs during disasters. Gender aspects in WaSH during recovery were overlooked by the government actions, an aspect noted in other research (O'Reilly 2010; Sommer 2011). The empirical evidence shows how women in Assam faced difficulties in accessing safe WaSH facilities during disasters and the recovery phases.

7.1.2 Policies and schemes related to WaSH and Recovery

The following policies and schemes in WaSH and recovery are examined for understanding critical gaps in implementation (Table 7.1):

- Water supply schemes: National Rural Drinking water programme
- Sanitation schemes: Total Sanitation Campaign
- Disaster Management Policy (2009) and Act (GoI 2005) and state plans and relief manuals (Revenue Department 1976; Government of Odisha 1996; ASDMA 2012a; OSDMA 2013)

The Ministry of Drinking Water and Sanitation, Government of India is in charge of national programmes such as the Total Sanitation Campaign (which includes Nirmal Gram Puraskar, later renamed as Nirmal Bharat Abhiyan, and addressed as Swach Bharat Abhiyan since October 2014) and National Rural Drinking Water Programme for ensuring safe drinking water and sanitation.

Table 7. 1: Gap Analysis of WaSH and disaster management policies in India (Source: Author)

Policy/ Scheme	Features	Implemented by	Institutional and funding		Challenges
			Assam	Odisha	
<u>National Rural Drinking water programme</u>	Decentralised and Public-private partnership between GP and PHED; Shift the focus from handpumps to PWSS, focuses on avoiding reliance on single water sources, which can be contaminated during natural calamities, integrated use of traditional systems Convergence with TSC and MGNREGA for ponds construction, drainage, latrines	Ministry of Drinking Water and sanitation (MDWS) Water supply and support organisation (WSSO) for monitoring, community participation, capacity building ASHA Workers shall be paid an incentive of INR 75 per water supply connection. Northeast states have 10% funds reserved through central support	APHED maintains PWSS and spot sources (conventional hand tubewells, Direct Action (Tara) pumps, India M II/M III pump, and RCC ring well. In Assam, activities include 1. Minimum Need Programme (MNP) 2. Accelerated Rural Water Supply Programme (ARWSP) 3. Rural Water Supply 4. Swajaldhara plan 5. <i>Jalmani</i> scheme for school water supply 6. Water quality through testing 7. Formation of Village level user's committees for PWSS	Department of Rural Development, Odisha. Funds are under-utilised and only 52.28 % habitations are fully covered, 47.71% are partially covered and only 2.27% PWSS are reported to be managed by the rural population.	Only 2% for natural calamities with 100% allocations by the central government as per policy, which limits the funds available from the state to address rural drinking water after disasters. Policy emphasises water security but lags behind in implementation; knowledge generation is top-down. Gender-blind policy approach: Nominal representation of women at village-level committees; trained and employed as mechanics

Policy/ Scheme	Features	Implemented by	Institutional and funding		Challenges
			Assam	Odisha	
<p>Swachh Bharat Mission</p> <p>(SBA/SBM) Clean India Mission, 2014 (Also TSC/NBA) Total Sanitation Campaign-TSC Nirmal Bharat Abhiyan)</p>	<p>National flagship programme to provide access to individual household latrines (IHHL) to all rural households, schools, anganwadis and public institutions</p> <p>Convergence with MGNREGS with INR 4,500/- for labour, INR 4600/- NBA, beneficiary contribution of INR 900/- for SC/ST, small marginal farmers, landless labourers physically handicapped women-headed families</p>	<p>MDWS with two Sub-Missions, the Swachh Bharat Mission (Gramin) and the Swachh Bharat Mission (Urban)</p> <p>Involves BDOs and CDPOs, GP Executive Officers and AWWs, DWSM through their District Project Coordinators, District level WSSO Consultants, Asst. Engineers, Block level Junior Engineers, Grass root level SEMs and field functionaries involved in IHHL construction.</p>	<p>APHEd: Under TSC only 50.20% IHHLs, 64.88% Balwadi Toilet and 18.48% Sanitary Complex constructed</p> <p>Need to accelerate sanitation coverage</p> <p>Components of national programme include:</p> <ol style="list-style-type: none"> 1. Start-up activities (baseline surveys) 2. IEC activities 3. Rural sanitary marts and production centres, district revolving funds, community sanitary complex 	<p>Department of Rural Development, Odisha</p> <p>NBA calls for yearly list generation, finalisation through verification, and approved by Gram Sabha and Panchayat Samiti for eventual approval by Zilla Parishad for IHHLs</p> <p>For subsequent years it shall be placed to Gram Sabha in usual manner during preparation of labour budget of total MGNREGS works.</p>	<p>Annual beneficiary identification, subsidies provision, convergence with MGNREGA, which has abysmal records of implementation in the state are deterrents in sanitation development.</p> <p>In the context of disaster recovery, the opportunity for advocating changes and generating demand for sanitation is missed.</p> <p>Lack of support for Households/habitations interested in constructing latrines post-disasters and lack of provision of latrines within the disaster shelters for children, elderly and disabled</p>

Policy/ Scheme	Features	Implemented by	Institutional and funding		Challenges
			Assam	Odisha	
Disaster Management Act (2005) and Policy (2009)	Policy refers to reconstruction to build disaster resilient structures and advocates for speedy, owner driven, linking with safe development and livelihood restoration	Under the Disaster Management Act, 2005 NDMA and state and district authorities to oversee DM; National Institute of Disaster Management (NIDM) for capacity building	Assam Relief Manual (1976) Assam follows the manual for relief provision, does not include recovery. Line departments engage in water supply post-disasters besides relevant preparedness measures	Odisha Relief Code (1996) Emphasises provision of drinking water supply, and recovery measures by line departments post-disasters, however completely missed sanitation	1. Erosion is not acknowledged as a natural disaster, hence affected families do not receive relief or rehabilitation support. 2. Lack of emphasis on restoration of WaSH facilities, sanitation is missed in relief manuals

Table 7.1 describes the policies and highlights critical gaps in humanitarian WaSH interventions as follows:

- a. The existing policies emphasise immediate WaSH relief measures by the line departments (PHED, Assam and RDD, Odisha) – drinking water supply, disinfection, repair and restoration of PWSS and spot sources post-disasters.
- b. The policies do not reflect a multi-hazard perspective in preparedness, restoration and compensation for damages at the household level through the schemes.
- c. The national WaSH policies, namely the National Rural Drinking Water Programme (NRWDP) and Total Sanitation Campaign, do not factor WaSH service provision into recovery and allow for transition into development schemes. The annual provision of subsidies for household latrines and water supply did not take account of the losses incurred, and there are systemic deficiencies in the implementation of sanitation schemes in the development context.
- d. The manuals, policies and programmes do not incorporate women’s needs and challenges faced during disasters, and are blind to gender sensitivities during relief distribution. There are no separate WaSH facilities for women, or privacy in the relief camps and cyclone shelters.
- e. The programmes do not clearly define the role of local actors in recovery, as the approach is fragmented into various development projects and schemes (Sections 5.4 and 6.4). The state government and line departments have limited funds and resources at their disposal to address WaSH recovery needs. The policies incorporate incentives for grassroots workers for installation of WaSH facilities, but these could be intensified post-disaster.
- f. Although policies reflect the need for water quality improvement, and hygiene promotion, these rely on IEC materials as the only approach, which is often outdated. Hence there is a need for wide-ranging approaches that incorporate newer and feasible technologies to face disasters, to generate awareness and to engage in behaviour change communication.

This research argues that provision of WaSH facilities during recovery is a critical gap, which requires policy attention. A holistic approach to WaSH programmes will enable progress in sanitation, improve access to water supply post-disasters and instil hygiene behaviour changes. It is argued that there is a potential for strengthening local actors’ role in WaSH during recovery through devolution

of power and authority, and strengthening attention to incorporate women's roles in WaSH to reflect the dynamism of women's capacities and needs during recovery.

The central finding from the analysis of government response is that recovery is the missing link in the policy shift from a reactive response to proactive prevention approach in the Disaster Management Act of 2005 and the Policy, 2009. These do not consider erosion as a natural disaster, thereby preventing the government and NGOs from providing relief and rehabilitation support to erosion-affected households in Assam and Odisha. The State relief codes and manuals were found to be inadequate as a guiding document for Government relief: the provisions in the codes lay down the process to be established before, during and after a disaster, and assign duties but leave it open for the District administration on the specifics of how to perform those duties, to protect the basic rights and entitlements of the affected population. The line departments follow out-dated relief manuals for post-disaster action – the Odisha Relief Code, 1980 (updated in 1996) and the Assam Relief Manual (1976) – that do not reflect the complexities of recurring, 'localised' and multiple disasters or provide clear, adequate emphasis on recovery of WaSH and related systems for longer-term, as reflected in other studies undertaken in Odisha (Ray-Bennett 2009a).

Lastly, the division of disaster management functions in the government, for relief coordination and undertaking recovery, results in a fragmented approach. For instance, the SDMAs focus on preparedness and coordination during disasters, while the Revenue and Disaster Management Department focus on recovery and rehabilitation. There were differences between the recovery activities undertaken by the SDMAs in Assam and Odisha, which could be attributed to the evolution of the state bodies and political acceptance of disaster management over the years, and availability of resources for recovery. In Assam, there is a growing movement for considering the Assam floods as a national problem, which will allow for central funds as grants instead of the current provision of funding as loans (Das 2007). In Odisha, OSDMA demonstrated evolution in recovery planning and increasing capabilities by spearheading the reconstruction programme after the cyclone in Odisha, whereas ASDMA was limited in its recovery mandate (Section 5.5.3). Recovery projects and funds were channelled through development programmes, mainly focussing on flood control and management measures such as embankments and anti-erosion works, which are inadequate to

address the recurring flooding and erosion in Assam. The progress achieved by institutionalising disaster management through the Act, state policies and plans are definitely steps towards the right direction, which reflect aspects of community resilience despite the above gaps in recovery and WaSH.

7.1.3 Humanitarian WaSH programming and recovery

The humanitarian NGOs in Assam and Odisha undertook different approaches, which were different from the government response to address emergency WaSH needs. In Assam and Odisha, Agency A demonstrated its strength in addressing WaSH needs holistically, reaching out to the farthest affected areas and marginalised communities, who are likely to be missed by the government. However, the programmes were designed on the basis of emergency needs assessments by the agencies and donors. The UK AID programme in Odisha was a massive undertaking to distribute emergency relief kits to more than 21,000 affected households in Odisha. The ECHO-funded programmes in Assam and Odisha included rehabilitation of water sources, provision of intermediate shelters, communal latrine facilities, and livelihood support through cash transfers.

This research argues that time-bound, short-term recovery programmes are unable to address WaSH needs for all the affected households and hence resort to targeting the more vulnerable household groups, or providing shared or communal facilities. The response programmes fail to address the longer-term issues – hygiene behavioural changes and open defecation practices – within short timeframes (6-8 months). In Assam, Agency A installed WaSH facilities that were washed away during the recurring floods or abandoned during displacement. Community priorities and needs for private latrines, sustainable livelihoods and secure housing for longer-term recovery fell outside the existing programming structures. The ECHO funding in Assam was only for 6 months, after which the agency withdrew its operations due to lack of funds. In 2013, a new embankment was constructed that put the villages on the ‘wrong’-side of the new embankment and exposed households to recurring floods and erosion due to breach in the new embankment forcing communities to relocate. This regressively impacted the installed WaSH facilities and recovery of households in Assam.

Agency mandates and guiding principles influence humanitarian interventions. The humanitarian dossier signed by Agency A distinguishes disasters into four categories, and defines the ways of working with partners and international affiliate agencies for each category.³⁰⁰ Accordingly, in Assam and Odisha prioritisation of disasters occurred: Agency A did not intervene when floods and erosion recurred in Assam. In Odisha, Agency A provided only relief support for 3 months to communities affected by floods, overlooked erosion-affected areas in Balasore, and provided recovery support for 6 months to cyclone-affected districts.

The working principles for Agency A, as part of a comprehensive framework for emergencies, include a rights-based approach, sectoral expertise, an integrated approach, a risk reduction approach, working with locals and partners, gender equality and protection, learning and improving its own performance, accountability to the affected communities and donors, and advocacy.³⁰¹ Following these principles agency A developed its strengths and expertise in emergency WaSH and livelihoods, logistics and financial systems, participation and learning mechanisms. The gender programming approaches included strengthening women's roles through planning and implementation, and ensuring women had direct access to humanitarian assistance and equal

³⁰⁰ It sets the criteria and procedures, notwithstanding the priority level of a country, when a specific humanitarian crisis breaks out such event – together with our existing capacity and strategies in the specific context – is assessed and categorised in order to decide how (and if) Agency A has to respond. Humanitarian crisis are sorted as: Category 1 – high2 level, Category 2 – moderate level, Category 3 – low level; Non-Category – no response is required or possible.

³⁰¹ Rights-based approach (the right to a decent livelihood, to essential services, a voice in decision-making and an identity free from discrimination), expertise (considerable institutional knowledge and capacity to deliver in specific areas of emergency response: food security, emergency livelihoods, emergency shelter, public health promotion and in particular the provision of safe water and sanitation), an integrated approach (humanitarian, development and campaign work to maximise impact, humanitarian work often incorporates programs to rebuild livelihoods or to empower people to speak out, organise and have a voice in changing their situation), a risk reduction approach (reduce the future vulnerability of communities to disasters by integrating risk reduction strategies into its long-term development work through initiatives that build communities' resilience, including giving them a say in decisions that affect them and training them to be emergency responders; and disaster preparedness work, such as planting trees to reduce the risk of flooding and landslides, or building cyclone shelters), working with others (with local people usually the first to respond to a crisis, local partner organizations and affected communities), gender equality (emergencies exacerbate existing power relationships in families and in communities. During humanitarian crises, there are more female-headed households, and women and girls are more likely to be the target of violence), protection (all civilians affected by conflict and disasters should be protected from the threat of violence, coercion and deliberate deprivation, and that they have the right to receive the humanitarian assistance they need. Civilians are increasingly targeted in armed conflicts, and women and children are particularly vulnerable), learning (improving its own performance to deliver better quality humanitarian assistance and protection, have the credibility and evidence base to influence the performance of the international humanitarian system to deliver more and better protection and assistance), accountability (to the affected communities, as well as donors, makes its work more effective, as well as giving beneficiaries ownership of the projects that affect them. This entails involving disaster-affected people in the design, implementation and evaluation of programs, consulting them on decisions that affect them and providing complaints mechanisms), influencing others (influence the performance of others, including national governments and the UN system, to provide greater assistance and better protection for people affected by natural disasters and conflict),

control over essential resources. These working principles influenced programming strategies in WaSH during recovery, and will be referred to again (Section 7.2-7.3)

7.2 How can learning, knowledge, and participatory approaches help in translating the window of opportunity available during recovery into action?

The empirical evidence provides understanding of the three approaches used in WaSH during recovery – learning, knowledge and participation – to facilitate changes in WaSH systems.

7.2.1 Learning approaches in WaSH during recovery

The empirical evidence suggests learning during recovery occurred through two mechanisms – social and organisational learning – based on experiential learning and learning from each other. It is argued that although learning approaches could potentially facilitate changes in WaSH systems and practices, there are constraints in the existing mechanisms.

Following Pelling and High (2005), Pelling (2011) and Manyena (2009), this research understands social learning as a process that enables communities to survive disasters through changes in behaviour, and developed on the basis of trust and relationships (Section 3.4.1). The empirical research indicates social learning in WaSH occurring through *WaSH coping strategies*, *WaSH preparedness measures*, and *hygiene behavioural changes*. Wisner et al (2004) describe coping strategies as urgent actions undertaken with the objective of survival in the face of a potential disaster. This research refers to *WaSH coping strategies* as practices that progressively enable households and communities to meet their survival WaSH needs after disasters. *WaSH preparedness measures* refer to household and community actions undertaken prior to disasters based on the experiences of previous disasters. The objective is to minimise damages incurred during disasters to WaSH facilities and ensure access during disasters. *Hygiene behavioural changes* refer to sustained improvements in existing knowledge, attitudes and practices over time. These three forms of learning help to understand how social learning mechanisms in WaSH can help

translate the window of opportunity available during recovery, also part of the emerging themes on *WaSH trajectories* (discussed in detail in section 7.5.1).

As *WaSH coping strategies*, household and community members adopted new and safe WaSH practices based on information provided by agencies on safe hygiene practices and prior experiences. The WaSH practices prior to disasters posed health risks as women, children and the elderly fell sick during disasters due to water-borne diseases (Section 5.2). These included post-disaster corrective measures to meet immediate water supply, instead of relying on contaminated floodwaters, submerged handpumps and open water sources. To correct open defecation practices, areas for open defecation were demarcated away from the water sources, and emergency and communal latrines were built and used by the members. Another strategy was to rely on social networks, mainly neighbours, friends and family members for WaSH support. In Assam, households had adopted strategies such as sharecropping, shared homesteads, and use of communal handpumps to distribute the financial burden and risk of losses amongst a group of households.

Households and communities undertook *WaSH preparedness measures* in areas affected by regular disasters, sometimes with the support of PHED and humanitarian agencies. Raised handpumps were installed above previous flood levels, based on hazard history and community knowledge of living with disasters. In Assam, agencies provided handpumps and latrine facilities on raised flood mounds for access during floods. In Odisha, agencies installed raised water sources, which were used during the 2013 Cyclone Phailin. During recovery, Agency A constructed raised platforms for handpumps, and provided them with privacy screens as preparedness measures. Communities regenerated ponds and lakes, and installed regulators in artesian wells to regulate the flow as alternative water sources.

Hygiene behavioural changes depended on enhanced awareness of safe hygiene practices, and understanding of risks associated with unhygienic practices. These changes reflected the intangible aspects of learning in WaSH such as attitudinal changes and activities arising in response to an on-going experience. Pelling and High (2005) consider that behaviour includes internal and tacit activities such as conscious or unconscious cognition, emotional affect or the formation and

operation of personal relationships. The households adopted low-cost water purification measures such as use of cloth filters, alum and chlorine tablets, and boiling. In Assam, household members washed their hands using local materials such as ash, banana skin or soil. The changes were brought about by hygiene promotion activities, and existing guidelines advocate for learning and behavioural changes with the help of not just IEC materials but through participatory or learner-centred approaches (John Hopkins and IFRC n.d.).

However, social learning mechanisms face certain constraints that limit how the window of opportunity available during recovery is translated into action. Firstly, these mechanisms address immediate post-disaster WaSH, but longer-term sustainable changes are ignored. Social learning fails to transcend into recovery where communities face cyclical and recurring disasters. Secondly, the social networks are not effective to fulfil long-term WaSH needs because households get displaced during disasters, and local power dynamics influence social cohesiveness and sharing of resources. In Assam there were tensions between the indigenous groups and immigrants i.e. Bodos and Ahoms and Bangladeshi Muslims. This led to differential access to existing WaSH facilities (Section 5.2.5). Lastly, the financial costs of construction and maintenance of raised water sources were borne by households. The technical knowledge of operation and maintenance of facilities was important – the raised structures were at risk of contamination during disasters if there were cracks in the concrete aprons, or due to broken sanitary seals. These findings are similar to the existing understanding of emergency WaSH interventions, which show that the sustainability, feasibility and safe maintenance of the WaSH infrastructure remains an area of challenge in emergency WaSH (Smith 2009).

The second mechanism of learning occurred at organisational sites – governments, humanitarian NGOs, and across NGOs in a consortium. As is obvious, there are differences in how agencies learn and institutionalise changes in their approaches through individual learning, prior experiences and learning from each other and from communities. During recovery the government actions focused only on flood protection in Assam, and cyclone mitigation and rehabilitation in Odisha (Section 7.1). The different approaches by the governments of Assam and Odisha depended on the nature of disasters, prior experiences, mandates and capacities of disaster management institutions, and

willingness to learn and implement changes. After the 1999 super cyclone in Odisha, the GoO and OSDMA had developed a 'culture of preparedness', which helped prevent casualties during the 2013 cyclone. This was achieved through search and rescue teams, evacuation and early warning systems, and speedy relief mobilisation for affected households (Dash 2013). OSDMA planned and proposed a reconstruction programme with World Bank - Asian Development Bank funding for construction of cyclone-shelters, housing, and slum redevelopment (Section 6.5).

Contrastingly, in Assam, the government dealt with recurring floods. Government learning from previous flood experiences was limited, as the underlying issues – recurring floods and erosion, rehabilitation and resettlement – remained unaddressed. Moreover, learning from previous responses was not documented to strengthen future actions. Evidently the state flood management and anti-erosion works demonstrated this lack of learning effort by the government. Since 1954, structural measures such as construction of embankments, dykes and river training had been adopted to prevent floods (Das 2007). The ad hoc construction of embankments after the 2012 floods failed to check erosion and river movement, and the embankments were breached during subsequent monsoons in 2013. It is argued that the communities living in the region, with traditional knowledge to deal with the floods, were not involved in decision-making in the government flood management programmes. The riverine populations were alienated and forcefully relocated without resettlement support. The exchange of local traditional knowledge and scientific technical expertise was missing in the government action.

Learning in humanitarian agencies occurred through institutional mechanisms and collaborations with other actors – local NGOs, other agencies in a consortium and communities. Agency A institutionalised monitoring, evaluation and learning (MEAL) mechanisms in the response programmes in Assam and Odisha (Section 5.6.2 and 6.6.1). This research argues that the mechanisms support transfer of learning from one programme to another, but overlook underlying structural issues within each context. For the agency, learning was specific to programmes, and hence similar tools were used across all programmes – to understand WaSH needs, Agency A used sectoral assessments, real-time evaluations (RTEs), and WaSH knowledge, attitude and practice (KAP) surveys (sections 5.6.2). These tools were applied within the pre-designed humanitarian

response programmes. Expert consultants were hired for WaSH sectoral assessments to recommend toilet design, bathing facilities, and water source rehabilitation plans (Section 5.6.2). Since the programme outcomes and budget were determined before the assessment was carried out, the experts were not mandated to suggest corrective measures to address open defecation in short timeframes.

Agency A relied on RTEs for programmatic learning including short-term, mid-course programmatic changes as well as longer-term programmatic and strategic recommendations. In Odisha, the RTE team suggested use of context-appropriate latrine materials that would allow ventilation; hence tarpaulin sheets were replaced with bamboo mats for the latrine walls (Section 6.6.1). In Assam and Odisha, transferrable lessons were adopted, which shows that learning from one programme to another response occurs, mainly because similar interventions were undertaken within the two programmes. These lessons included distribution of sanitary cloth, along with demonstrations by the public health volunteers on how to use sanitary pads and cloths. In Assam, the RTE team recommended distribution of solar lights for security and privacy of female members during defecation and bathing, which was replicated in Odisha. However, critical analysis and reflection of organisational mandates and systems was beyond the remit of these evaluations and learning mechanisms. If the agency did not intervene, RTEs did not evaluate non-interventionist approaches or the non-inclusion of longer-term issues of resettlement, sustainable livelihoods and women's empowerment within recovery programmes.

The agencies undertook WaSH KAP surveys to understand household changes with a baseline at the beginning of the programme for designing the hygiene promotion strategy. The results of the end line survey, at the end of the programme, are compared with the baseline to understand the impact and changes initiated by the programmes in household WaSH practices. However empirical findings show that KAP survey findings were merely used for reporting purposes, and not for developing sustainable changes in WaSH practices. The hygiene promotion strategies were based on field assessments and staff perceptions instead of KAP findings, because the KAP baseline is undertaken after the programme proposals are designed, submitted to donors and finalised. Despite the

potential for assessing changes and learning from KAP surveys, agencies failed to capture the processes involved in WaSH implementation.

Agency A also learnt as part of the consortium model in Assam and Odisha (Section 5.6.3). The consortium model was adopted in recent disasters in India; pushed by donors for its value for money, programme outreach, scale and visibility. This research argues that consortia can act as spaces for collaboration with joint efforts at documentation of best practices and advocacy. These spaces, Wenger (2000) argues, allow for contestation of ideas. However, since they are donor-driven, consortia last only for the programme's duration. Different NGOs participating in the consortium adopt flexible and diverse approaches, useful for advocacy and influencing policies. The consortium, in which Agency A participated in Assam and Odisha, adopted diverse programming approaches through consultations with local NGOs and communities based on contextual understanding (Section 5.6.3). In Odisha the consortium model worked as a collaborative platform for knowledge management, which documented the programme objectives and outcomes through regular newsletters, meetings, workshops and digital platforms.³⁰² These were supported by the international donors, and limited to the funded programmes. Besides, there were agency networks and Inter Agency Groups (IAG) in both states are involved in coordination during disasters, and joint needs assessments, but have limited roles in recovery (Section 5.6.3 and 6.6.3). This research argues that existing consortia approaches have potential but fail to sustain effective learning approaches that transform organisational policies and practices.

Learning approaches can help in translating the window of opportunity available during recovery into action, if the learning from interventions is translated into the daily lives of affected populations and not limited to programming. This echoes the findings from studies on learning for resilience and recovery (Manyena 2009; King 2015). Reflecting on theories of learning (Section 3.4), the empirical research shows that learning occurred through step-by-step corrective measures in Assam and Odisha. Using theories on learning from (small) disasters (Voss and Wagner 2010), the learning at

³⁰² http://www.sphereindia.org.in/Download/03.11.2014%20Sphere%20Newsletter_November%202014%20Issue%20No%205.pdf and <https://phailincyclonerresponse.wordpress.com/>

various levels – households, communities and government organisations – occurs within a single-loop. Such learning focuses on first-order changes, which are direct consequences of experiences of disasters. Agency A demonstrated capacities to engage in second-loop learning, which acknowledge prevailing behaviour patterns and allow new problem-solving techniques. The learning is specific to the programme interventions within specific contexts and correction of mistakes within the existing guidelines and benchmarks. Thus humanitarian actors engaged in ‘learning for improvement’, the double-loop-learning, where the focus is to examine current interventions, enhance existing capacities, and incorporate suggestions for improvement of interventions, processes and operating procedures. However, the opportunity provided during recovery is missed because third kind of learning – deutero-learning – does not occur. This learning engages the actors in critically questioning and addressing underlying issues of open defecation, menstrual hygiene, erosion impacts, land entitlements and relocation support. Learning to meet such objectives rarely occurs because the stakeholders’ focus remains on only one level. This research contends that ‘learning to understand’ based on past failures; participation of all stakeholders and addressing structural issues is absent in the existing learning mechanisms. The organisations should engage in deutero-learning as discussed by Voss and Wagner (2010), in which agencies go beyond simple error corrections, question underlying causes and trigger additional learning.

7.2.2 Knowledge approaches

The knowledge aspect of agency approaches is examined through technological interventions and documentation (Section 3.4.2). The humanitarian WaSH interventions provided technological solutions in water supply, treatment and sanitation facilities. The humanitarian agencies rehabilitated the existing water sources, along with concrete aprons, drainage and soak-pits to avoid contamination of groundwater through seepage from the cracks. The empirical evidence suggests that the suitability and appropriateness of the technologies was essential to address the WaSH needs during recovery. The in-house expertise within agencies was limited; programme implementation was undertaken by expert consultants, who had limited time to understand local knowledge, and information on available and appropriate technological solutions in WaSH that are relevant to the context and nature of disasters. The proposed solutions were constrained by budgets. In Assam, the latrines were built using tin sheets, which were too hot to use during the

summer season. In Odisha the shared latrines were semi-permanent as the walls were made of tarpaulin sheets, which could be easily damaged by cyclone winds in the coastal areas. One of the biggest challenges faced in recovery WaSH and available technologies was the pre-existing open defecation practices. Although agencies provided emergency communal latrines, and shared family latrines during recovery, the households preferred private latrines or continued open defecation.

For the agencies, the mobility of households and frequent relocation as a coping strategy, worked for some aspects of resilience but created specific problems with respect to expensive, fixed WaSH. Mobile sanitation technologies using local materials were required in flood- and erosion-affected areas in Assam instead of communal fixed latrines. The agency-built, fixed WaSH facilities were abandoned when communities relocated in 2013. Similarly, in Odisha the mobile, communal Vestagaard water-filters were unsuitable due to turbid water conditions. These required regular repairs, knowledge and familiarity of the users for proper use and maintenance. Such technologies need prior testing and piloting; market-based solutions and cheaper alternatives should be explored with local manufacturers. There was a knowledge gap of what appropriate sanitation technologies would work in the given hazard and geographical context of coastal Odisha (Section 6.5).

This research found challenges in documenting knowledge: the existing surveys, formats and tools were used to capture, manage and report data for donors and fundraising, but the programming decisions and implementing processes were not captured or retained in institutional memory. This aspect of knowledge generation in NGOs has been criticised in existing literature (Twigg and Steiner 2002). Since consultants and local partner NGO staff implemented WaSH technologies, they learnt through trial and error. The knowledge retention depended on the involvement of the core staff (on institutional payrolls) with the programme during implementation. On-the-job experience of what technologies worked within each specific context remained with the individuals and was not retained as institutional memory. Tacit knowledge of context-specific approaches and processes in programme implementation was not captured in the institutional memory either. Existing studies argue the need for documenting what technologies and approaches work in different emergency contexts (Brown et al. 2012), which remains a gap as observed in Odisha. Strengthening knowledge approaches – a range of technological solutions, market-support for WaSH, capturing programming

processes and outcomes of existing approaches – will help in translating the opportunity available during recovery into action.

7.2.3 Participatory approaches

Community participation is considered as *de rigueur* for development interventions in the water supply and sanitation sector (O'Reilly 2010). This research examined the extent and outcome of participatory approaches in recovery programmes in Assam and Odisha and found that post-disaster agencies used participation as a phased approach. This thesis argues that agencies should factor when the communities are included in decision-making process, and what are the remits of their influence over agency decision-making. Initially during the relief phase, there were limited opportunities for participation within short timeframes (0-3 months), so agencies undertook blanket distribution where all the households were provided with emergency kits. The village development committee members – local leaders, traditional leaders, local elected representatives and health workers – were consulted for developing household lists of beneficiaries in the most-affected villages. Emergency water supply, source repair and chlorination, and construction of emergency latrines and bathing cubicles were undertaken after consultation with local leaders. The agencies used participatory tools during assessments to gather data and decide programme objectives, instead of involving communities at the programme designing and planning stages.

The lack of participation in the initial phase is problematic because programmatic decisions are taken at this stage; proposals are submitted by agencies to donors. In Odisha the UK AID and ECHO proposals were submitted within less than a month of the disaster (Table 6.1). The communities were limited to providing information at this stage, and had no power over key decisions. Therefore programmes did not appropriately reflect the community recovery priorities and longer-term needs. The dynamic household and community changes – displacement, migration, and WaSH trajectories – during recovery were not factored into humanitarian programmes. In Assam, the multiple flood waves led to frequent displacement of affected populations, which posed challenges to the WaSH programme teams as the WaSH facilities at the relief camps in schools or on embankments were abandoned and new facilities had to be reinstalled in the relocated areas.

The empirical evidence indicates that local communities were gradually involved in WaSH projects. Later, agencies constituted and consulted village committees and task forces for beneficiary targeting, designing community projects and site selection (Section 5.6.2). Sector-specific committees were constituted for CFW, livelihoods, and water and sanitation projects at the village level. The WaSH committee representatives were consulted for decisions on beneficiary targeting and siting of WaSH facilities. They were provided with information about government schemes, training on disinfection and repair of water sources, and provided with toolkits for operation and maintenance of WaSH facilities. However, the roles and responsibilities of the committee members and their functions beyond the programme duration were unclear. These committees were functional as long the programmes operated – when the project staff visited the areas for implementing or monitoring they engaged with the committee representatives. In Assam after the programmes ended, the committees became dysfunctional and did not meet regularly because members had relocated or migrated. This finding is similar to previous research on community participation in post-disaster housing and reconstruction (Davidson et al. 2007). That study illustrated that the point at which the communities are involved in decision-making determines the result of the recovery programmes (ibid). This research suggests that community participation should be integrated in the programme design as early as possible by including beneficiaries upfront at the design stage, and by providing definite roles for communities, who are the key stakeholders but have the least power.

The empirical evidence demonstrates that participation was limited in scope in the programmes as agencies followed routine and conventional approaches, led by the guided-participation (Twiggy et al. 2001), or exploitative participation (Pelling 2007) model. There were tensions between efficiency (controlling labour and time costs) and inclusiveness (expanding participation) in the recovery programmes. The programmes failed to address the root causes of inequalities, and responded to the 'community' as a homogenous entity – with similar needs and voices. This research argues that merely adopting community participatory processes does not enable the communities to transform themselves. It is important to understand who are included within the recovery programmes from the communities. The empirical research demonstrated that after the disasters the humanitarian agencies reached out to the vulnerable and marginalised groups, who lived in the rural fringes and

inaccessible areas in Assam and Odisha. However, they could not address diverse identities, multiple needs, capacities and practices due to short timeframes and budgetary constraints. The inclusion of vulnerable groups was crucial to ensure that community consultation processes were truly representative. The humanitarian agencies particularly targeted vulnerable households for the WaSH interventions based on specific inclusion criteria: women-headed households, elderly, disabled and poor affected households.

A crucial aspect of inclusion in humanitarian programmes was related to women's participation in the village committees and beneficiary targeting. For women to participate in decision-making at the household and community it is necessary to address the underlying household and community power dynamics. Agency A demonstrated a gendered approach in their recovery programming through gender-sensitive planning, which included female members in as project staff, in WaSH committees and WaSH facilities' user groups. Agency A included women-headed households for WaSH, livelihoods and shelter support. The agency understood that women's participation in community projects enhanced their capacities, developed their understanding and increased social cohesion. In Assam, the RTE team commended their sensitivity towards women's needs, household priorities and responsibilities by adopting flexible timings to encourage gender participation in CFW projects, hygiene campaigns and village meetings. Despite these approaches, the recovery programme in Assam faced challenges due to the power dynamics and underlying social relationships in the households and communities. The male members objected to women's involvement in community projects in both Assam and Odisha. They gave reasons such as women's security concerns, perceived criticism by villagers, and the *purdah* system in Muslim communities (Section 5.6.2.4). In Assam, male members revisited decisions on site selection and targeting, arguing that these decisions were misguided, as women were less aware due to illiteracy and lacking requisite information.³⁰³

The evidence shows that women's ability and freedom for accessing WaSH facilities is a gendered problem, not one that can be solved by 'women's participation' alone (O'Reilly 2010). This research

³⁰³ Semi-structured interview: LA- 6 September 2013, Solmari, Assam

suggests that thorough analysis and regular discussions with household groups, community consultations, and participation of both men and women in choosing sites for WaSH facilities will help resolve these aspects. Such measures bring to the forefront the underlying complex relations of power that enable or disable women's participation in WaSH programmes, decisions about siting, and their usage of water sources, bathing spaces and latrines. As Sultana (2010) argues, understanding the gendered dynamics of both disasters and the interventions is necessary for comprehensive and robust policies and projects.

7.3 How effectively do agencies facilitate the integration of emergency response with long-term development across different sectors?

This research explores integration across NGOs and government actions over time, and within different sectors during recovery. The empirical evidence suggests agencies can address temporal integration through LRRD and preparedness measures, and address sectoral integration by planning and implementing comprehensive interventions during recovery.

7.3.1 LRRD approach and preparedness

Recovery is often the missing link in LRRD approach, though it is key for effective transition from relief to development. The humanitarian agencies' programming strategies to achieve temporal integration did not explicitly mention LRRD approaches. The empirical research found two programming strategies – exit strategies and preparedness measures – are used by agencies for temporal integration. The exit strategies included community capacity building, generating demand for safe WaSH facilities and linking them to government programmes through advocacy. The WaSH facilities and community assets were handed over to the user groups and local communities. The latrine user groups were trained on cleanliness, operation and maintenance, and provided with cleaning materials for latrines. The WaSH committee representatives and water user group members received training on operation and maintenance and were provided with toolkits to open, repair and maintain the handpumps. The list of trained local facilitators was shared with the local leaders, PRIs, and district government bodies. The typical exit strategy was to link the recovery

projects with government rural employment, housing, sanitation, and water provision programmes.³⁰⁴ Accordingly communities received training and information about existing government schemes for WaSH.

The systematic linking with development programmes was challenging because government programmes were dysfunctional in Assam and Odisha.³⁰⁵ In Odisha, Agency A, as part of a consortium, undertook surveys to understand the implementation of the government schemes. In Puri, the work under the MGNREGS was undertaken only for 60 days in the past six years. In the ECHO-funded consortium programme in Odisha, agencies were responsible for engaging in advocacy with the government. A consortium member reflects:

“Our experience of working in recovery has been very mixed, because [of] the way things have been designed and perceived by donors, with recovery limited to early recovery – meeting the immediate needs maybe for 3-6 months. Not necessarily all recovery [interventions] leads to rehabilitation or build back better. Practically you need processes, better knowledge to prepare for disasters.”³⁰⁶

This research argues that despite the exit strategies – community capacity building, handing over of WaSH assets to communities, and linking and advocacy with the government – there were institutional barriers that posed challenges during the transition from relief to development. The humanitarian agencies faced challenges not only from the inefficiencies in government programmes, but also organisational barriers such as lack of funds and commitment to address longer-term recovery objectives. In Agency A particularly, after the humanitarian team exited, joint proposals were submitted along with regional offices for longer-term programmes. This indicates that there were strong divisions between relief, recovery and development objectives as perceived by the actors, donors and governments, which were further constrained by time and resource allocation.

³⁰⁴ NREGA, Indira Awas Yojana, TSC and NRDWP

³⁰⁵ Survey Results: Agency A, February 2014, Puri, Odisha

³⁰⁶ INGO professional, Interview: INGO-4

Temporal integration was achieved through preparedness measures, initiated by the government and humanitarian agencies. To this end, agencies provided emergency cash, and constructed shared latrines and communal handpumps, which prepared communities against future disasters. During disasters, preparedness measures saved lives and ensured access to WaSH facilities. An official stated:

*The key synergy in relief and recovery is actually preparedness. Just one word – be prepared. So our work is preparing people, systems and infrastructure to face a shock in the form of rescue boats, or raised handpumps, raised storage, or whether it is preparing ourselves to do immediate cash transfers to provide people with cash in hand for food support after disaster.*³⁰⁷

Agency A and partner NGOs enabled communities to prepare through construction of raised mounds, and rehabilitation of damaged water sources, with WaSH facilities and other community assets. Preparedness allowed for recovery immediately after the disaster struck. This research argues that existing programming strategies in WaSH are unable to facilitate the integration of emergency response with long-term development because the exit strategies lack guidelines to operationalise LRRD, and struggle to link with government programmes due to system inefficiencies.

7.3.2 Inter-sector integration

Integration across sectors, although crucial for recovery, is not effectively addressed in the existing recovery approaches. The empirical research shows sectoral integration occurring at two levels: between WaSH and other sectors (shelter, livelihoods and others), and within WaSH (water, sanitation, hygiene and menstrual hygiene). The empirical evidence suggests that within time-bound programmes sectoral integration is often overlooked; the fragmented approaches to various sectors limit the potential for holistic changes during recovery. The existing sectoral integration approaches do not fit the households' and communities' recovery priorities (Sections 5.2.2 and 6.2.2). There were different priorities across various communities in Assam and Odisha that included longer-term challenges – land and food security, livelihood support and protection measures such as embankments (Tables 5.4 and 6.8). These priorities changed over time, and differed according to

³⁰⁷ INGO professional, Interview: INGO-3

gender, age, mobility, and socio-economic conditions of the household members. The erosion-affected community groups prioritised longer-term issues like security of land tenure, assured income generation through livelihood recovery, and protection from the river, while the cyclone-affected groups prioritised essential services such as water supply and livelihood and shelter rebuilding. The humanitarian programmes and top-down government approaches did not reflect these variations within recovery priorities, or community visions for longer-term recovery. The communities perceived resilience as not just physical recovery of lost assets but also aspired to escape the vicious trap of poverty and recurring disasters.

In Odisha, the humanitarian agencies integrated CFW with WaSH needs by building community assets such as ponds, water tank construction, and pond and debris cleaning. This integration was achieved at the community level because communities were involved in identification of projects and implementation. The priorities were set by communities to include water supply and storage, which was integral to their holistic recovery along with shelter, safe raised land, and protection of assets from floods and cyclone (Section 6.3.2). The resultant integration in the recovery programmes was ad hoc, and often a by-product of community participation; it was not the primary focus of the programmes. The programming strategies for sectoral integration were unclear, as sectors were prioritised based on funds and expertise. Overall the focus was on shelter and cash transfers, while WaSH received nominal attention. Shelter construction was prioritised based on visibility and coverage, while hygiene promotional activities were intangible. Cash transfers received more attention, enabling households to purchase their essential items depending on functional markets, and were faster to implement if the systems are in place.³⁰⁸ On the other hand, WaSH investments and hygiene promotion require longer-term commitment and extended presence of the humanitarian agencies with the communities.

This research argues for integration not just within sectors, but also within WaSH programmes. The evidence suggests there are disparities in funding and interventions for sanitation and hygiene promotion, particularly menstrual hygiene. The water component is prioritised in terms of coverage

³⁰⁸ INGO professional, Interview: INGO-3

and operation costs. From a systems perspective, agencies incorporated redundancy within WaSH systems by setting up alternate water supply sources, and alternate sanitation mechanisms for controlling open defecation. Within WaSH, community groups prioritised access to adequate and safe water supply higher than sanitation (tables 5.4 and 6.8). This depended on their perceptions and attitudes towards sanitation, pre-existing practices, awareness of risks associated with open defecation and contamination of water sources. This awareness and knowledge about the risks can be enhanced through public health promotion activities and financial and technical support in construction of latrines by humanitarian agencies. Agency A focused more on constructing latrines, bathing cubicles and rehabilitating water sources, which were visible aspects of WaSH, while the intangible changes in hygiene practices and menstrual hygiene were difficult to capture. The focus was on outputs such as the number of hygiene campaigns, training programmes and village meetings, and changes identified from KAP surveys, but these did not reflect the outcomes of hygiene behavioural changes that occur over the longer term. Similarly menstrual hygiene was ignored, since discussing menstruation was considered a taboo; women were culturally prohibited to openly discuss their private needs and concerns. Therefore, this research argues that integration is an essential component within WaSH, and across WaSH and other sectors that are essential for recovery, in order that the changes over time are transformational in nature where community recovery priorities are holistically addressed to facilitate community resilience.

7.4 Reflecting on the research framework and questions

In this section, I reflect on the conceptual framework on resilience in WaSH (Chapter 3) and the research questions in the light of the analysis of empirical evidence (See Figure 7.1). Initially the conceptual framework was developed to explore WaSH systems during recovery with the help of identified themes – learning, participation, institutional capacities and integration. However, there were certain contextual, scalar, temporal and methodological challenges while using the framework, which emerged during the fieldwork and analytical stages.

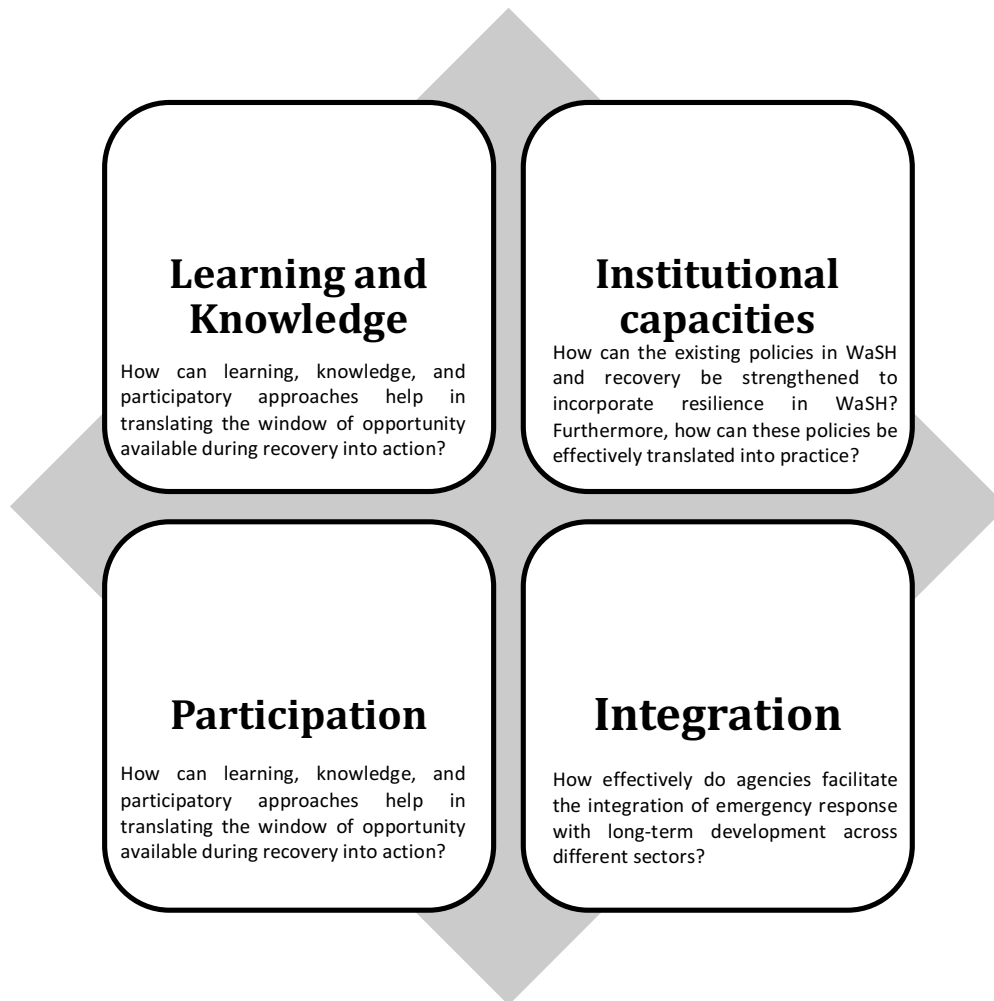


Figure 7. 1: Community Resilience: Conceptual framework for WaSH during recovery

Contextual aspects: The foremost challenge of using a two-dimensional framework was that it did not incorporate any context. Using the same framework in two different contexts in Assam and Odisha showed differences in the stakeholder capacities and interests, the nature, impact and frequency of disasters in each context. The WaSH development scenario and the communities' response and changes after the disasters were different in both case studies. Hence, including the context of the recovery and resilience processes – recurring nature of disasters, one-off mega disasters like cyclones, and pre-disaster socio-economic development context – helps in understanding how recovery is different in each context and what factors determine the changes in WaSH practices and access to WaSH facilities. The context-specific WaSH practices and development progress in sanitation and improved access to water supply can help analyse what transitional

approaches can be used to link relief, recovery and development. A central argument of this thesis – that institutions are unable to address the underlying structural issues, which cause disasters in the first place – can be reflected in the framework by including contextual aspects.

Scalar aspects: The conceptual framework did not depict the scalar perspective – the actors and stakeholders involved in WaSH and recovery – for analysing recovery and resilience. Referring to the multi-scalar perspective in the framework will help to interpret actions and response by various actors and understand the differences within each response. It emerged during the main fieldwork in 2013, that values and power aspects were absent in the framework because multiple actors and their responses were not part of the framework. The empirical research showed that each actor interprets resilience differently. Hence, clear depiction of scale in the framework enables the reader to position themselves for better understanding and interpretation. Including the scalar aspects of recovery helps in establishing linkages between the actors, and the power dynamics between the actors.

Temporal aspects: The empirical evidence showed that cyclical and recurring disasters influenced recovery processes; hence learning, participation and institutional capacities can be studied at various points in time to understand how recovery is impacted. This research argues that temporal aspects are important as the recovery process unfolds over time, while organisational interventions are over shorter timeframes and consider recovery nearer to the time of the disaster. Existing studies have highlighted the need for longitudinal and retrospective studies to identify, understand and sustain changes stimulated by disasters. This research demonstrated that WaSH practices and access to facilities changed over time; hence acknowledging the temporal aspects within the framework will identify approaches to establish and sustain WaSH behavioural changes.

Methodological aspects: The framework was developed to understand community resilience and how agencies can facilitate recovery using different approaches. However, during the course of subsequent fieldwork and analysis the agency perspective changed gradually. The microscopic focus on households and communities (see section 7.5.1) helped to develop an understanding of the inherent dynamic linkages and interactions post-disasters. Including methodological aspects in the

framework can specifically guide agencies to implement WaSH during recovery focussing on emerging WaSH trajectories, and dynamic recovery processes. This will inform the sampling strategy, the selection of villages depending on the NGO interventions. Therefore, I believe that the methodological approach, had it been focused entirely on developing a framework to guide humanitarian actors, or government institutions, would have emphasised different aspects during recovery. This is a direction for future research, which could produce rich insights.

Developing a tool for practitioners for understanding recovery could include how the data for each indicator is gathered and ranked (Annexure 3). This can guide agency interventions during recovery. This is a reflection stemming from my dual role in the field as a practitioner and researcher, on how agencies design and implement their recovery programmes. As a reflective practitioner, I found that the agencies used participatory tools to gather information, not to fulfil the emancipatory objectives of participation (Le De et al. 2014). Rather agencies used participatory tools merely to guide and inform the programmes. Hence developing a tool for practitioners could describe the methods involved for data gathering and analysis.

Similarly, in light of the empirical data analysis and with the hindsight of having conducted this research, I revisit the original research questions. This offers an opportunity to reflect on whether these questions were appropriate to begin with, and how can they be posed differently. The main research question "How effectively do different approaches to water and sanitation facilities, and hygiene practices, during post-disaster recovery promote community resilience to disasters?" was the guiding framework of this research. Any modification in this question would have altered the theoretical foundation of the research. The focus on community resilience provided a different perspective and value to this research. Perhaps a different starting point would have enabled me to understand degrees of changes in WaSH practices by households, and interventions by both government and NGOs. In hindsight, it emerges that the sub research questions could have been framed in such a way to provide a clearer perspective to understand changes at household, community and policy levels. A stronger focus in the research question to understand what triggers and sustain changes in WaSH behaviour could have helped identify learning approaches and

strategies that agencies could adopt to use the window of opportunity provided by disasters to make lasting changes.

Lastly, I believe that posing an additional question could have helped me to gather, analyse and present empirical data in a richer manner *“How do households affected by disasters learn and change their practices related to WaSH during recovery; and what does this tell us about how do communities cope with recurring disasters?”* Such a research project could have provided tangible insights on how existing policies are or are not working, instead of a commentary on how WaSH policies are currently being implemented. This research project of course, would have required a completely different set of methodological approaches, and would be a far more ambitious project.

7.5 Emerging themes from the empirical evidence

The aspects of context and scale helped to analyse agency approaches to promote community resilience. This section describes new emerging themes, which were not originally reflected within the framework and research questions. These microscopic and context-specific aspects of WaSH and recovery processes help to study how households’ and communities’ WaSH systems are impacted by disasters and how they recover over time. The analysis of gender and household perspectives, and intra-household power dynamics, helps to understand how these influence household recovery processes and access to WaSH facilities. These aspects were ignored within standardised humanitarian programming and top-down government action. This section marks the transition of thinking in this research, where the initial understanding of WaSH from a systems and technological outlook moved to a viewpoint of agency response and recovery programmes, to gradually acknowledging that the socio-economic and cultural aspects of WaSH during recovery are also critical to develop an advanced understanding of resilience. The emerging themes from the empirical evidence, on WaSH trajectories in recovery, gendered processes of recovery and coproduction of learning are described in detail.

7.5.1 WaSH Trajectories during Recovery

This section discusses emerging findings at the household and community level, using the term ‘trajectories’ to understand different scenarios, as described in the empirical chapters (Section 5.2 and 6.2). The evolution of recovery along a continuum is fundamental to the notion of trajectories in this research. Trajectories have been previously used in studies on complex adaptive systems, and socio-ecological systems to understand changes over time (Holling 1973; Ramalingam et al. 2008; Guijt 2007; Broto 2015), and in resilience studies (Mayunga 2007). The recovery trajectories after disaster have been the focus of discussion for many years (Moser 2008, p.6), indicating differences in hazard exposure and disaster impacts between different sites (Chhotray and Few 2012). Trajectories help in understanding the WaSH recovery processes in Assam and Odisha, which emerge from the same event, and evolve over time, and in different locations. The arrows indicate these trajectories, representing dynamic household trajectories in a continuum and possibilities of multiple realities based on experiences, and variations and context-specific manifestations (Figure 7.2).

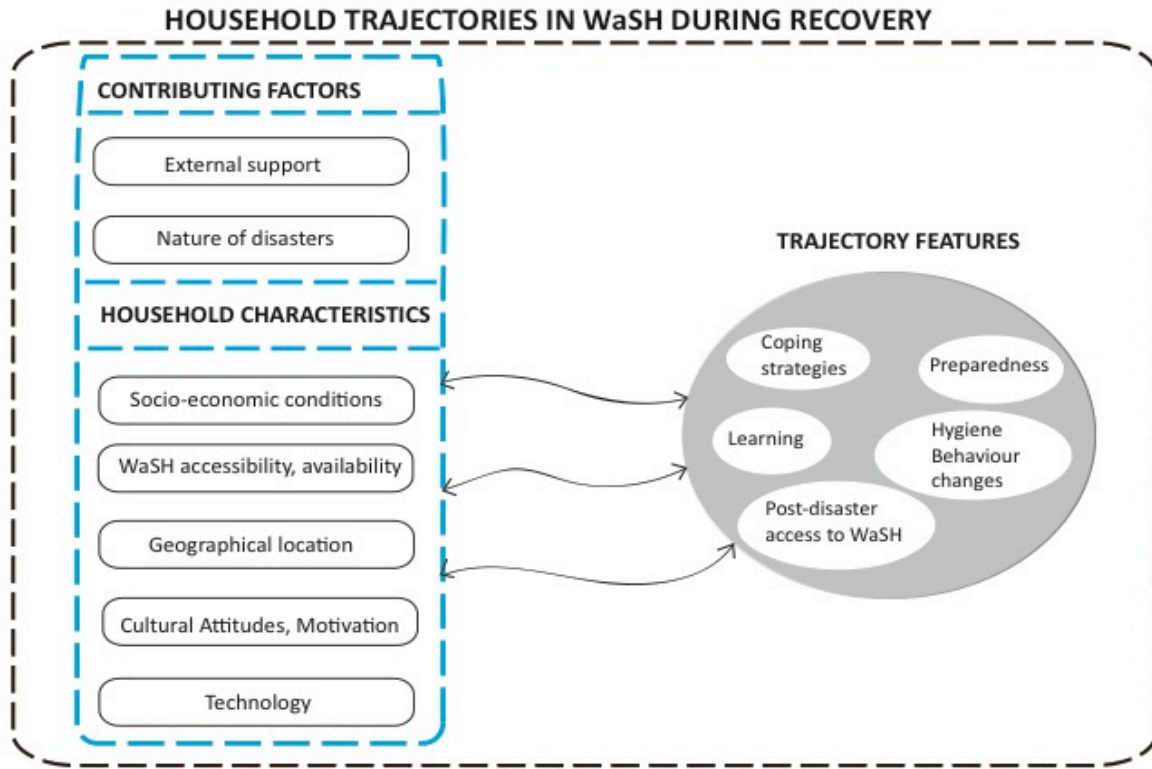


Figure 7.2: Household Trajectories in WaSH during recovery

Figure 7.2 represents a micro-level, disaggregated depiction, shaped by (and shapes) the following three elements, as recovery unfolds. These are:

- A) Household characteristics (such as socio-economic conditions, cultural attitudes and motivation, location, technology, prior access and availability of WaSH facilities)
- B) Contributing factors (nature of disasters and external support)
- C) Trajectories features (learning, coping strategies, preparedness, hygiene behaviour changes and post-disaster access to WaSH)

The household characteristics are linked with the contributing factors – nature of the disaster faced by the households, and the availability of external support through government or humanitarian actors. The resulting trajectory features depend on these characteristics and factors, working in conjunction with each other. Thus, the trajectories are path-dependent, influenced by a set of factors and their presence or absence. The factors, in a loosely bounded box, indicate porous boundaries, which are influenced by larger socio-political processes. These processes include macro-level policies related to resettlement support, forced relocation, migration or flood protection measures like embankments, or issues related to land ownership, livelihoods and housing.

Socio-economic factors: The households displayed variations in their WaSH practices and recovery investments depending on a complex interplay of socio-economic factors such as gender, caste, tribes, religion, immigrants, class and economic conditions. The empirical evidence shows differences in the communities' access to WaSH facilities and knowledge of safe hygiene practices depending on socio-economic factors (Section 5.2 and 6.2). In Assam, the poor households lived in temporary settlements for the five months of the monsoon, with limited abilities to invest in private handpumps or latrines. Those households, who had a secure means of income through remittances, or businesses in the townships, were able to invest in latrines post-disasters in Assam, or repair the water-sources. In Odisha too, the fishing households lived on a hand-to-mouth existence and did not invest in or prioritise individual water sources or latrines.

Cultural attitudes and motivation: Culture influenced the local knowledge and motivation influenced changes in WaSH practices post-disasters. In Assam, women traditionally used *kolshis* for water

collection, and used clothes or alum for filtering water. In Assam and Odisha, these practices reiterated over time, and played out in relation to agency interventions, such as use of chlorine tablets or candle water filters for water filtration. The cultural attitudes and generational perceptions deterred many household members from using latrines – men continued defecating in the open although household latrines existed and insisted women use latrines for their security and safety after dark (Section 6.2.4). In Assam, children demanded for school latrines (Section 5.2.5), while the elderly members preferred to defecate in the open. This difference was due to generational attitudes (Section 5.2.5), because the elderly are conditioned to use latrines from the previous generations – their attitudes are difficult to change, a finding similar to a study conducted by Coffey et al (2014) in a non-emergency context in India. The individual motivation of men, women, children, and elderly, as well as inter-household power dynamics influenced household decisions on WaSH investments during recovery.

Prior WaSH accessibility and availability: The prior access³⁰⁹ to WaSH influenced household trajectories depending on household and agency investments in WaSH. In Assam, women travelled 1-2 kilometres and waited for more than an hour for collecting water (See Section 5.2.2). During disasters women had to travel farther using boats to collect water from distant water sources, or by wading through deep floodwaters. The availability of safe drinking water was constrained due to damages to the existing sources, and extensive use by the displaced households. As per Census 2011, Assam has coverage of 59.6% of household toilets. During disasters, in both Assam and Odisha, members continued to defecate in the open – near bushes, floodwaters or on the roadside. The pre-disaster lack of toilets could be attributed to economic reasons, cultural attitudes, socio-economic reasons, lack of awareness about the intrinsic and extrinsic benefits of accessing toilets within the household, and the appropriate technologies as explained further. Studies in Assam have identified lack of cost-effective solutions for latrines and low priorities accorded to latrines as deterrents in household investments in latrines (Global Sanitation Fund 2013).

³⁰⁹ Access to drinking water means that the source is less than 1 kilometer away from its place of use and that it is possible to reliably obtain at least 20 litres per member of a household per day (WHO/UN-Water 2012)

Technology: Technology influenced the availability of WaSH facilities in the rural areas. The households lacked technical knowledge of operation, repair, and maintenance of handpumps (Section 5.2.5). In Odisha, the raised handpumps fell into disrepair due to lack of maintenance (Section 6.2.1). The artesian wells in Odisha indiscriminately exhausted the groundwater, due to unregulated flow. Depending on the nature of the disaster and subsequent actions, appropriate technologies suitable to the context were essential. The frequent displacement of households was challenging for suitable WaSH technologies used in the region. Mobility as a strategy of flood-affected households in Assam affected fixed WaSH facilities, as it disrupted household access, and risked WaSH investments being washed away due to erosion (Section 5.2.5). In Assam, Mark-2, Popular -6 and Tara direct action pumps were in use, which were raised for protection against floods, but when communities were displaced due to erosion they had to abandon these facilities. For addressing these concerns in WaSH it was necessary to develop suitable and appropriate cheaper alternatives for post-disaster WaSH interventions. For sanitation, an evidence base for technological solutions in the coastal areas in Odisha was missing (Section 6.5.1). This deterred investments in latrines in Odisha by the household, community, government or NGOs. As argued earlier, this research found that local solutions for latrines were essential depending upon the geographical locations and nature of disasters.

Geographical Location: As one would expect, there are underlying tacit connections between household location and socio-economic statuses in determining access to WaSH facilities. Table 6.2 indicates the differential availability of water supply facilities in Odisha across the different villages. In Odisha, the households in coastal and island locations depended on communal water sources, while in the inland villages, the households owned individual handpumps. The topographical aspects, living in hazardous locations and frequent displacement due to disasters have an influence on existing WaSH infrastructure. The household location emerges as the background where the relationships between households, their social networks and access to the WaSH facilities play out at any given point in time. The topography influenced household water and sanitation technologies. In regions suffering from regular flooding, raised WaSH facilities were built; in areas, suffering from erosion there was a need for mobile water supply, treatment and sanitation technologies. The households living in hazardous areas – in close proximity to rivers, coastal areas, islands and *chars*

were susceptible to disasters, and the WaSH systems had a propensity to suffer damages during disasters. In coastal Odisha, cyclone and flood shelters for refuge during disasters lacked WaSH facilities. In Assam, in government schools run as relief camps, affected populations were denied access to school WaSH facilities (Section 5.2.2). When households on the 'wrong' side of the embankment, unprotected by the river relocated, they abandoned WaSH facilities in 2013. This indicates that geographical location influences the WaSH trajectories in conjunction with the nature of disasters.

Nature of disasters: This research found that the impact on WaSH systems depended on the disaster types – cyclones, floods or erosion. The recovery processes depended on the impacts, and the agency support. In cyclone-affected areas in Odisha, the storm surge caused structural damages to the WaSH facilities in the coastal and island villages leading to groundwater contamination (Section 6.2.3). While in the erosion-affected areas in Assam and Odisha, the WaSH facilities were completely washed away, so households resorted to open water sources. In flood-affected areas, the nature of flooding had different consequences for the WaSH systems: overtopping or breach of embankments destroyed existing WaSH infrastructure, water inundation led to submergence of WaSH facilities and groundwater contamination affecting water quality. The empirical evidence indicated how these influenced the household trajectories in WaSH: households adopted structural measures that suited the hazard context. In areas of submergence the WaSH facilities were constructed on raised platforms, or on stilts, while in areas where erosion was a regular phenomenon, households invested the least amount of resources in WaSH facilities or mobile structures that could be easily dismantled. For instance, households used self-built primitive latrines, and installed handpumps that were easy to remove and reinstall during relocation.

External support: The presence, absence and quality of external agency support influenced the WaSH trajectories. In the presence of humanitarian and government agency support, there was improvement in WaSH facilities and practices. Agencies provided raised water sources and sanitation facilities, and installed communal toilets for easy accessibility during disasters on a raised mound (Section 5.2.2 and 6.2.3). In Assam, agencies used locally available materials for emergency latrines and raised water sources. In addition, the humanitarian actors held hygiene promotion

campaigns and community awareness programmes for enhancing WaSH knowledge, attitudes and practices. In instances when external agencies did not give support during recovery, the WaSH trajectories depended on the prior access to facilities, experiential learning, motivation and socio-economic factors. For instance, households built primitive latrines after the 2013 floods in Assam, and Odisha, which were financially cheap, but not technically improved sanitation facilities. Therefore, it was important that households had financial and technical inputs to make the WaSH facilities safer, mobile, cheaper and resilient to disasters.

The influences of household characteristics and contributing factors in the recovery and resilience process result in various household trajectory features. The WaSH trajectories vary between households, and each household may exhibit one or many of the trajectory features: coping strategies, learning, hygiene behavioural changes, preparedness and improvements in post-disaster access to WaSH facilities, some of which were presented earlier in this chapter. The outcomes of learning, coping, hygiene behaviour changes and preparedness were discussed in Section 7.2.1. The improvement in post-disaster access to WaSH emerged as a significant and tangible feature of the WaSH trajectories. There was an improvement in knowledge and practices during recovery, because households relied upon the communal handpumps and latrines. The households had access to Vestagaard filters and candle water filters that helped improve water quality. During recovery, households had access to improved WaSH facilities in the villages, and WaSH facilities were provided at the relief camps, embankments and schools. These improved access to WaSH during recurring disasters. The improved access is indicated through increase in the number of available water sources, the smaller distances from households and settlements to access WaSH facilities, and lower number of people sharing the facilities, and the resultant decrease in the queuing time at the water sources. Through external interventions, rehabilitation of damaged facilities allowed for improved access to WaSH sources (Section 5.2.2).

7.5.2 Gendered recovery processes in WaSH

The empirical evidence draws attention to the intra-household power dynamics and underlying social factors defining gendered roles and responsibilities in WaSH (Section 5.2 and 6.2). As women are responsible for water collection and storage, cooking and childcare, their role is implicit within

the *WaSH trajectories*. It becomes challenging during floods and cyclones because the nearest water sources are damaged, so women access distant sources by wading through neck-deep water, or depend on men for boats to travel in floodwaters to fetch water. It has been argued in existing studies that although men participate in a gendered activity, this is not a true reversal of gender roles, but a temporary role (Sultana 2010). This research indicates that the entrenched gender norms and sensitivities make it difficult for women to recover, as they are constrained in addressing their personal needs regarding menstrual hygiene and defecation during disasters. Women go for open defecation early in the morning or after dusk to avoid being seen, for issues related to privacy and dignity. The issues related to menstrual practices and maintaining personal hygiene are often overlooked in post-disaster priorities. Women's need for privacy was more a socially dictated norm, for inappropriateness of men gazing at them, while bathing, defecating or urinating. This echoes findings from a non-emergency context in rural Rajasthan (O'Reilly 2010). Menstrual hygiene emerged as the 'silent' need, which was least expressed or discussed but was essential for women's dignity, privacy, health and wellbeing. During emergencies, due to lack of latrine facilities and sanitary materials, women faced difficulties in washing, changing and drying the used menstrual clothes (Section 5.2.3). The use of sanitary pads had cost implications, when women had little control over the household finances, and were unaware of the proper disposal mechanisms for sanitary pads (Section 6.2.3). The cultural norms isolated and secluded menstruating women and adolescent girls, who faced mobility or dietary restrictions. This lack of awareness and knowledge of hygienic practices and related cultural norms were generational, impacting women's participation in daily activities and chores, and school attendance during menstruation for adolescent girls.

These *gendered recovery processes* form the second emerging theme of this thesis that women are burdened by their 'triple roles' - productive, reproductive and community in the post-disaster situation (Ray-Bennett 2009b). This empirical research highlights that within the household trajectories during recovery, the men, and women (children and elderly or disabled) have different needs and different access to WaSH facilities post-disasters. Instead of calling these women's needs or priorities, this research recommends agencies use gendered approaches to show that although the differential impacts on women can be singularly addressed, it is equally important to be sensitive

to men's perceptions and attitudes towards women's needs, roles and responsibilities related to WaSH during disasters. Ignoring or overlooking gender priorities or unmet needs affected daily household activities, health and wellbeing during disasters (Section 5.2.2). In Assam, men overruled decisions taken by women regarding siting of facilities (Section 5.6.2).

Although it is acknowledged that women initiate changes at the household level in WaSH through handwashing, use of latrines, and safe water handling practices, the decision on household investments in latrines is often taken by men to protect women and children from assault during open defecation in the dark. These intra-household power dynamics and power imbalances within the community influenced control of resources and investments in WaSH, livelihoods or house repairs during recovery. Social processes in regular lives were exacerbated on interaction with natural disaster processes to produce the differentiated vulnerabilities and sufferings that ensue, which have gendered implications.

The gendered recovery processes also occurred due to out-migration of men and youths in Assam and Odisha to earn income in the towns and cities, leaving behind the women, children and elderly. The women were responsible for relocating and rebuilding post-disasters, while the control over money – in the form of remittances, resources and land ownership – remained with men. This limited women's choices in household investments in leasing land, paying masons, purchasing essential items, or installing handpumps or latrines. There were gender differences in recovery priorities: women prioritised WaSH based on their understanding of the preventive benefits of safe hygiene practices, and the difficulties they faced in accessing WaSH facilities during disasters. The men prioritised productive assets such as livelihoods, shelter and land security during recovery while women prioritised water supply, sanitation and education as recovery objectives (Section 5.3.2). These priorities were negotiated, contested and acted upon differently by the men and women within the households depending upon the intra-household power dynamics (cases A6-A8 in section 5.2.5).

7.5.3 Coproduction of knowledge

The analysis of empirical data highlighted a new emerging theme – coproduction of knowledge by affected households, communities, local actors, government and NGOs. This involved generating knowledge of safe WaSH practices, and use of local traditional knowledge for promoting community resilience through WaSH with external support. In Assam and Odisha, households participated in the recovery programming where they were jointly involved in community projects with the agency A in WaSH knowledge generation and asset building. This was undertaken through enhanced awareness of safe WaSH practices, construction of WaSH facilities, and shared understanding of local construction practices and hazard context. This joint production of knowledge is termed here as coproduction of knowledge (Armitage et al. 2009; Hegger et al. 2012). The households along with other stakeholders play a key role in the coproduction of knowledge (Edelenbos et al. 2011).

This research found instances of coproduction of knowledge in WaSH, where community participation and agency support led to changes in newly installed WaSH infrastructure post-disasters. The participatory processes were directed towards developing community participants' technical expertise in repair and maintenance of handpumps, and mobile latrine construction through training workshops and demonstration. In Assam, agencies built on traditional practices of *chang ghars* (houses on raised stilts) along with handpumps and latrines in Assam, and raised handpumps in flood-prone areas. In Odisha, agency-built latrines were modified to suit the local context through community feedback and participation in the construction process (See section 6.5). In CFW, community members participated in the construction of raised mounds with WaSH facilities for access during disasters, pond generation, and debris cleaning post-disasters. This coproduction mechanism enabled households and communities to have access to WaSH, whereby the institutions provided technical knowledge and expertise for dealing with regular disasters.

This chapter earlier described the challenges in learning, knowledge and participatory approaches, which limited the extent of coproduction of knowledge as understood in this research (Section 7.2). The agencies had limited understanding of indigenous practices, and short programme durations hindered the extent of participation and learning across agencies, households and communities.

Chapter 8: Conclusions

This chapter presents the conclusions of the research on building community resilience in WaSH during ongoing recovery processes. It answers the research questions and provides recommendations (Section 8.1), discusses theoretical implications of this research (Section 8.2) and presents its conceptual and methodological contributions (Section 8.3). It also suggests directions for future research (Section 8.4).

8.1 Answering the Research Questions

In this section, I answer the research questions and provide recommendations. The sub-research questions are:

1. How can the existing policies in WaSH and recovery be strengthened to incorporate resilience in WaSH? Furthermore, how can these policies be effectively translated into practice?
2. How can learning, knowledge, and participatory approaches help in translating the window of opportunity available during recovery into action?
3. How effectively do agencies facilitate the integration of emergency response with long-term development across different sectors?

Lastly, I answer the main research question and draw upon recommendations for policy and practice. The question driving this research is: *How effectively do different approaches to water and sanitation facilities, and hygiene practices, during post-disaster recovery promote community resilience to disasters?*

8.1.1 How can the existing policies in WaSH and recovery be strengthened to incorporate resilience in WaSH? Furthermore, how can these policies be effectively translated into practice?

Chapter 7 presented the existing policies, discussed the lack of agency WaSH support during recovery, and reflected on the gaps in the policies emerging from the empirical evidence. Although post-disaster recovery presented opportunities to improve practices and upgrade existing access to

WaSH facilities, there were contextual and programmatic challenges that were difficult to overcome. The agencies' – government, local actors and humanitarian NGO – policies and programmes focused on relief and response measures, overlooking WaSH needs during recovery. Government support – household subsidies under water supply and sanitation schemes, disaster damage compensation, rehabilitation and resettlement support – was missing in the recovery phase. The response focused on immediate relief measures, which was inadequate in terms of coverage in water supply. The government planning and efforts overlooked sanitation provision and hygiene promotion. This limited the scope for changes in WaSH practices and access to safe and improved WaSH facilities.

The analysis of national and state government policies and humanitarian agency programmes shows that WaSH during recovery remains a critical gap. The national disaster management policy lacks clear guidelines for addressing recovery objectives; government schemes in water supply, sanitation, and state disaster relief manuals overlook provision of holistic WaSH – sanitation, hygiene and menstrual hygiene – support post-disasters. In order to strengthen the government policies in recovery and WaSH it is essential to shift the focus from a short-term relief centric approach, which is limited to water supply only, and move towards longer-term transition focusing on holistic WaSH, including sanitation, hygiene and menstrual hygiene needs. The state relief manuals should be updated in order to address the increasing needs, complexities and challenges of recurring disasters (which may be of a multi-hazard nature), and vulnerabilities of the populations living in the at-risk areas. The national disaster management policy should consider erosion as a natural disaster and undertake measures for mitigating the losses due to erosion, and plan recovery and rehabilitation support for affected communities.

The recovery measures should include strategies to address and overcome existing challenges – prevalent open defecation practices, inadequate access to water sources, recurring disasters, insecure land and tenure aspects – for building community resilience. This research contends that WaSH should be addressed holistically in the post-disaster efforts, along with provision of adequate WaSH infrastructure in relief camps and multi-purpose relief shelters, and stronger commitment for improving progress in sanitation development during recovery. The post-disaster measures should

address disaster impacts on existing WaSH facilities through financial support and risk reduction within development schemes in rural water supply and sanitation. It is suggested that policies define stronger roles and build capacities of state authorities for disaster management and local government actors to address longer-term recovery – through identifying needs, proposing participatory recovery plans, and strengthening the local service providers including health, and education for outreach efforts in health and hygiene to tackle the challenge of open defecation by generating demand.

The humanitarian actors addressed the WaSH needs of the poor, marginalised and vulnerable groups, including water supply, sanitation, hygiene and menstrual hygiene. The recovery programmes specifically addressed gender needs in the affected communities and supported household recovery by including women in their interventions. However, the programmes were time-bound and shorter-term; hence, they found it difficult to sustain hygiene behavioural changes, and address open defecation, and structural issues related to riverine erosion, resettlement, failure of embankments and land tenure security. Agencies prioritised disasters based on available funding, disaster impacts and attention, which meant that erosion, recurring floods were ignored, and recovery measures were undertaken only after major disasters such as cyclones and large-scale floods. It is recommended that humanitarian agencies clearly define their recovery mandates, and influence donor policies for longer-term intervention. Agencies should include capacity building of local agencies and communities to address recovery objectives using participatory and inclusive approaches. This approach will enable communities to tackle attitudes and practices related to open defecation, and develop strategies to address larger-level issues related to flood protection, damage compensation and resettlement of communities living in flood- and erosion-affected areas.

8.1.2 How can learning, knowledge, and participatory approaches help in translating the window of opportunity available during recovery into action?

Section 7.2 explored and analysed learning, knowledge, and participatory approaches. The social learning mechanisms in WaSH focused on immediate WaSH needs, overlooking longer-term issues of access and changes in WaSH systems. Households and communities continued open defecation

and unsafe water handling practices without efforts to increase awareness, financial support and changes in attitudes. Government agencies differed in their approaches to initiate recovery processes, and in this way, they learnt from experiences. The post-disaster interventions focused on top-down protection measures without engaging, consulting and empowering the communities. The empirical evidence suggests that ad hoc embankment construction further exacerbated community vulnerabilities, forcing them to relocate in the event of recurring disasters. Analysis showed that social learning mechanisms focused on corrective measures, and humanitarian organisations engaged in learning for improvement, without bringing about radical changes in agency programming strategies and implementation.

This research concludes that participation of affected communities should be initiated in the design phase of the programmes, instead of a 'phased approach' where participation gradually increases in the response programme. The sustainability of WaSH committees and their capacity building were important to factor during implementation of recovery programmes. Agencies adopted inclusive approaches for representation in the villages, building upon existing village development committees. For strengthening and sustaining these organisations it is important to clearly define the roles of the members during and after the programmes have ended. Encouraging women's participation in recovery programmes and targeting female members during hygiene promotion efforts were effective in enhancing awareness and improving household WaSH practices. The emerging findings on *gendered recovery processes* show that WaSH during recovery should be addressed by involving both men and women during community participation to discuss issues faced by women in WaSH and in general during recovery. Participatory approaches should include decision-making on household investments, and challenges faced by women for accessing distant WaSH facilities, lack of privacy and secure spaces for bathing, and attending to their menstrual needs: these are culturally ingrained and depend on power dynamics at the household and community level.

Chapter 7 shows that the window of opportunity available during recovery is not translated into action. Hence, there is a need for strengthening institutional capacities to adopt learning, knowledge

and participatory approaches to meet the affected communities' recovery needs. These approaches can be maximised to translate the opportunity into action, by addressing underlying vulnerabilities of communities living in hazardous locations, resource-constrained environments, and facing recurring disasters and not just provision of WaSH facilities post-disasters. The emerging themes discussed in Section 7.5.3 indicates the potential for coproduction of knowledge of safe WaSH assets and practices to inform and sustain hygiene behavioural changes and increased access to WaSH facilities during recovery.

With this perspective, institutional capacities can be strengthened during recovery to prevent and mitigate impacts of disasters, and encourage people-centred development programmes. Developing an evidence-base for technologies in different disaster contexts, local practices and indigenous knowledge along with rapidly deployable market-based solutions and technologies as a preparedness activity will help improve humanitarian capacities for WaSH during recovery. Humanitarian agencies' monitoring, evaluation and learning mechanisms need to incorporate lessons learnt and critically reflect on programme mandates and contextual needs rather than proposing quick fixes and transferrable solutions. It is suggested that enhancing roles and responsibilities of different actors and stakeholders in coproduction of knowledge in WaSH and disasters by institutionalising consortia as space for collaboration and cross-learning can help translate this window of opportunity during recovery through focused actions and commitment from all stakeholders.

8.1.3 How effectively do agencies facilitate the integration of emergency response with long-term development across different sectors?

Section 7.3 explored the integration across time and sectors during recovery programmes. Humanitarian agencies' programming strategies did not explicitly include a linking relief recovery and development approach (LRRD): instead, exit strategies relied on linking programme activities with the government's development schemes. Integration across sectors – WaSH, shelter and livelihoods – through humanitarian programming was achieved to certain extent, while integration within WaSH – water supply, treatment, sanitation, menstrual hygiene, and hygiene practices – was

limited. The standard programme components, designed immediately after the disaster, were based on agency capacities and expertise.

To sustain post-disaster changes in WaSH behaviour it was necessary to provide institutional, financial and technical assistance to households during recovery. The households and communities had to recover themselves from cyclical floods and erosion, while struggling with poverty, insecurity in food, livelihoods and land tenure, and deal with the failure of embankments as protection measures. This research argues that integration across time and various sectors can help community recovery processes, preparedness towards future disasters and building inherent capacities for resilience. Presently, agency approaches towards integration are limited to fulfilling their survival WaSH needs, and restoring livelihoods and intermediate shelter. The research concludes that lack of integration adversely affects recovery processes, and results in forced displacement and outmigration due to hostile and resource-constrained environments and recurring disasters.

8.1.4 How effectively do different approaches to water and sanitation facilities, and hygiene practices, during post-disaster recovery promote community resilience to disasters?

The existing policies and practice fail to address holistic and longer-term recovery of households and communities affected by floods, cyclone and erosion. The recurring disasters pose significant threats to the WaSH systems and their unsafe practices pose health hazards in the emergency. This can be addressed through learning and knowledge approaches, as household and community members become increasingly aware of safe WaSH practices. Learning and knowledge is important to improve and transform their existing practices of open defecation, unsafe water supply, women's needs related to menstrual hygiene, handwashing and water treatment. The coproduction of knowledge, resulting from consultative processes, motivates communities to adopt household latrines during recovery in the absence of agency support. Agencies can support sustained changes in WaSH systems by providing appropriate technology and local cheaper alternatives in WaSH – suitable to the context and resilient to multiple disasters in the region – along with technical knowledge and expertise. For improving organisational learning mechanisms, this research suggests participatory approaches and developing an evidence base for context-appropriate technological solutions.

Humanitarian agencies adopted participatory approaches during the implementation stages of recovery programmes, whereas the government programmes lacked a consultative and participatory approach in their longer-term projects. Humanitarian agencies used inclusive approaches by targeting women-headed households, and involved women in their hygiene promotion activities. However, this research concludes that agencies should go beyond temporary quick fix approaches and support transformational changes at the community level, by analysing and addressing household power dynamics and gendered recovery processes.

The institutional capacities to plan, design and implement recovery programmes depended on agency mandates and ability to generate resources for longer-term programmes. For LRRD, pre-existing practices and attitudes – towards open defecation, consumption of contaminated water during disasters – should be changed. Agencies should prepare households and communities towards future disasters, and support longer-term recovery objectives during the transitional phase. The demand for improving efficiency of government programme implementation in the villages is crucial for effective integration of humanitarian, recovery and development aspects. This research concludes that post-disaster households and communities need to be supported, consulted and informed for designing and developing longer-term plans. This helps in reducing anxiety, frustration, losses and uncertainty due to recurring disasters in resource-constrained environments.

Through the analysis of emerging themes, and these approaches at different scales – household, communities, local actors, government institutions and humanitarian agencies – this research provides a new perspective on the initial conceptual framework components as *pathways for resilience*. These *pathways* allow for situating the central findings of this research as well as the emerging themes of *WaSH trajectories* and *gendered recovery processes*. Changes in WaSH during recovery gradually unfold over time and vary according to space, influenced by recurring disasters, pre-disaster WaSH context and institutional support. The learning and knowledge, participation, institutional capacities and integration pathways for resilience facilitate recovery and resilience from multiple and recurring disasters. Within these pathways, the roles and capacities of various

actors, the post-disaster and dynamic interactions between stakeholders can be analysed and strengthened.

8.2 Theoretical Implications

This research set out to understand the dynamics between WaSH systems and practices during recovery from disasters. The underexplored themes of recovery and WaSH (Chapter 2), was studied using systems thinking to understand actions across scales, roles of multiple actors and their approaches to build community resilience to disasters (Chapter 3). The empirical findings and data analysis discuss factors influencing WaSH systems by improving access to WaSH facilities and facilitating hygiene behavioural changes during recovery (Chapters 5, 6 and 7). These findings and analyses add to existing knowledge of how WaSH systems and practices are impacted by disasters, and how agency support can promote community resilience. There are theoretical implications for the existing literature on recovery, WaSH, and resilience. The recovery processes in WaSH at various levels – households, communities, government and humanitarian NGOs – from the response and longer-term activities are analysed.

The empirical evidence is reviewed to understand existing recovery approaches – BBB (Build Back Better), LRRD and window of opportunity (Chapter 2). When affected by multiple disasters, agencies prioritised disaster based on the scale of disasters and existing institutional capacities. The non-inclination of agencies to respond to regular disasters like erosion and recurring floods calls for larger-level policy actions to recognise erosion as a disaster. The non-interventionist approach fails to support household and community recovery processes. Hence, the empirical evidence suggests that recovery did not enable the building back better of disaster-affected households and communities. The LRRD approach has not gained currency with the humanitarian actors explicitly studied in Assam and Odisha. Agencies attained transition from response to development through preparedness measures and by building structurally resilient WaSH systems to prevent damages during subsequent disasters.

This research provides empirical evidence for participation in WaSH recovery programmes, and factors influencing implementation of technological solutions in different contexts. It is also important that communities are involved and participate in programmes that influence their recovery, development and overall wellbeing. This has implications for the top-down programmes undertaken by the government and guided participatory approaches adopted by NGOs which consider communities as a homogeneous entity, capable of envisioning inclusive recovery and resilience processes. There are intrinsic and extrinsic factors for sustaining hygiene behavioural changes and post-disaster access to WaSH facilities. The intrinsic factors – financial capabilities, technical knowledge for construction and maintenance, and motivation for using safe and improved water sources and latrines – lie within control of the household and community members. The extrinsic factors – disaster impacts, institutional support in coproduction of WaSH assets – lie beyond the control of communities. These factors have implications for build back safer recovery theories: due to inadequacy of safe and improved communal water sources and latrines installed post-disasters, household members used self-built primitive latrines, and consumed water from unsafe handpumps during recovery, which could not be categorised as ‘improved’ WaSH sources.

The findings also address the questions raised in the literature review: whom do we build back better for? (Section 2.1.3) In practice, the poor and vulnerable groups are identified through participatory approaches initiated by the humanitarian agencies. However, chapter 7 demonstrated that it is unadvisable to restore pre-existing conditions that lacked access to WaSH facilities or knowledge of safe WaSH practices. This research questions the feasibility of build back better as an approach; instead it adopts resilience thinking in recovery to consider household and community needs, priorities, aspirations and their vision for future. This perspective should support agencies to link programmes from pre- to post-disaster and beyond.

This research provides an alternative perspective of resilience, as a continual process of learning and knowledge, and participation of communities and institutions. For achieving resilience, time and space are important aspects influencing the resilience processes to transform household/community capacities. This shows that actors, units and institutions, at a given level, recover differently based on prior conditions. Through systems thinking this research highlights the

inter-connections and dynamics between actors at different scales. In this research, resilience thinking is used to explain differential access to WaSH facilities, institutional capacities to support recovery, household reliance on social capital. Resilience in WaSH systems during recovery can be promoted when hygiene behavioural changes are achieved through experiential learning, coproduction of assets based on local practices, hazard contexts and appropriate technologies provided by the institutions. Transformational changes are possible when underlying socio-economic issues and pre-existing practices are addressed through participation of the households, community and local actors in learning, planning and implementation. Therefore, resilience is not an end-objective or static concept, but understood as a process that consists of various building blocks – response, recovery or preparedness actions – influenced by dynamic interconnections between actors, communities and the environment. The foundation for building community resilience, in WaSH during recovery, lies in integration of institutional efforts with recovery trajectories and community priorities, over time and across all sectors.

8.3 Contribution to knowledge

This thesis contributes to methodological, practical and policy spheres. As indicated in Chapter 2, there are few studies that look at NGO practices of WaSH during recovery, and fewer still that relate to resilience, hence this research develops an understanding of how changes occur in WaSH practices. The empirical case studies explored recovery across different disasters – cyclones and recurring floods and erosion – describing the context, actors and their actions within a given policy environment (Chapters 5 and 6).

This research is original in its use of reflective practitioner methodology for gaining empirical evidence of changes in WaSH systems and practices through recovery programmes. This methodology provides insights into decision-making, processes and approaches deployed during recovery, and systems and mechanisms within organisations. The empirical evidence gathered through an insider's perspective is a useful guide for agencies involved in planning and implementing recovery WaSH programmes. The position of a reflective practitioner also allowed unique access to

community perspectives, expectations and resultant changes as part of a humanitarian organisation.

The practical implications of this research help translate the window of opportunity during recovery, by improving access to WaSH facilities, and facilitating changes in sanitation preferences and hygiene practices. The contribution of this research to the policy context lays strong emphasis on study and analysis of recurring disasters – floods and erosion – and their impacts on community resilience. Transformational changes in the policy sphere can incorporate longer-term roles and action by institutions, governments, humanitarian and local NGOs, and community organisations during recovery.

8.4 Key recommendations

There are key recommendations for humanitarian agencies working in WaSH during recovery based on this research, which include five critical aspects that will facilitate holistic recovery programming:

- 1) Supporting social learning mechanisms to address recovery and including alternative WaSH facilities for access during disasters;
- 2) Prioritising and triggering additional learning beyond corrective actions, improving programme implementation and facilitating coproduction of knowledge along with households, communities, and government agencies;
- 3) Testing, assessing and evaluating technological solutions for water supply, treatment and sanitation along with the household and community preferences;
- 4) Ensuring that inclusive and participatory approaches are adopted in the beginning of the response programmes, where communities have a larger role to plan and design programmes that affect their recovery, initiate and organise transformational changes over the longer-term recovery; and
- 5) Adopting an LRRD approach and integrate sectors in response and recovery in order to holistically address community needs. By adopting an LRRD approach, the pre-disaster developmental challenges of unimproved water facilities and prevalence of open defecation are tackled through effective government schemes and NGO action during recovery.

Based on empirical evidence, this research comments on the existing policies in Assam, Odisha and nationally on disaster management and WaSH schemes. In Assam, policy focus on the challenges faced by communities displaced due to regular floods and erosion was missing. The futility of embankments as flood protection mechanisms and resultant displacement of communities exposed to flood risks should clearly reflect in the flood management policies. This will lead to alternative measures for flood protection using scientific as well as traditional mechanisms for dealing with floods. The existing Assam Relief Manual, which guides the government bodies in the event of any emergency, should be updated to include holistic approach to relief and recovery. An integrated response should identify community needs during recovery, including water, sanitation and hygiene, along with shelter and housing options. The existing schemes can address recovery needs by compensating damages incurred in household toilets and/or providing incentives to promote latrines after disasters. This approach will help to engage communities proactively to end open defecation and reduce health risks.

In Odisha, the existing governance mechanism focused on disaster preparedness and mitigation measures. In the aftermath of the cyclone and subsequent floods, it emerged that a multi-hazard approach to disaster management will be crucial in building resilience to future disasters. The longer-term recovery plans and implementation of reconstruction programmes fail to maximise the opportunity to address pre-existing challenges and rebuild communities in a holistic manner. Sanitation emerged as the least prioritised aspect of the government response; existing policy mechanisms and schemes should address sanitation needs. Existing water supply and sanitation schemes should strongly focus on hygiene promotion.

The existing policies on disaster management and WaSH are blind to gendered approaches to recovery. This will reflect gendered aspects in the policies in a holistic manner, focussing on how water collection, transport of water and storage, defecation are undertaken by women and adolescent girls. This is also crucial to understand they bear the impacts and responsibilities of household recovery in the absence of men who migrate for work.

8.5 Issues for further research

This research primarily focused on WaSH during recovery; it did not explore shelter, livelihoods, and small businesses during recovery. Although a systems perspective would have enabled scrutiny of these sectors, it fell beyond the scope of this research. The emerging themes can be further unpacked in future research: recovery processes are characterised by different community priorities, WaSH trajectories, gendered recovery processes and pathways for resilience. Such a study could explain causality and interrelationships between factors identified in the WaSH trajectories across different scales, contexts and time. For instance, the dynamics between communities, and local organisations – government bodies, community based organisations, and role of civil societies – can be analysed with particular emphasis on development of WaSH systems in various contexts. Future research could either use a quantitative approach using development statistics to understand national government programme outcomes during recovery, or understand behavioural changes using ethnographic, anthropological perspective on social recovery. Future research could be a longitudinal study of recurring disasters to influence existing policies that will reflect realities of erosion and flood-affected populations. A longitudinal study of reconstruction programmes in Odisha after the Cyclone, or comparative analysis with the 1999 super cyclone, could study how transformative changes occur over 10, 15 or even 20 years following the disaster.

This study explored approaches used by institutions to effect changes in WaSH systems and behaviour during recovery, characterised by ideas of ‘learning’, ‘community participation’, and involving institutions. Future studies could use systems’ thinking for designing the research, identifying boundaries and analysing consequences and changes to provide a useful foundation for resilience thinking. This approach is feasible to explore and explain complex systems dealing with changes over time.

Future studies can specifically explore the socio-political context of WaSH programmes using a political-economy approach for resilience. In Assam, certain aspects of WaSH systems were guided by ideas of citizenship, legal ownership of land and other assets, rights and entitlements. Further research can explore how political identities influenced resilience in WaSH. The understanding of risks, perceived by communities and households in these areas, and the manifestation of hazards

across complex systems over time, and each context can provide enriching avenues for further research. This will help go beyond contextual uniqueness and generalise using in-depth, interdisciplinary research for improving knowledge of recovery and community resilience.

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Annexures

Annexure 1: State of art of WaSH programming and evidence: Activities undertaken under various WaSH interventions post disasters

No	WaSH Intervention	Types of activities undertaken
1.	Water supply	<ul style="list-style-type: none"> • Water supply at the community level, household provision and provision of storage facilities(John Hopkins and IFRC n.d.). • Repairing of water distribution networks, repair of leakages in the distribution systems (Smith, 2009; Parkinson, 2009). • Phased approach: Protection of wells, digging of new boreholes at the communal level, and distribution of water through public tapstands in camp areas; recovery efforts began the housing and emergency water treatment and distribution; followed by prolonged phase destroyed and contaminated water systems, wells and boreholes were restored, rebuilt or replaced (Clasen and Smith 2005) • Hardware installations such as handpumps (McGarry 1980).
2.	Water safety	<ul style="list-style-type: none"> • Treatment at the source or at the point of consumption • Testing for microbiological or chemical contamination • Provision of buckets with lid to avoid contamination during transport of water • Household level water treatment practices, safe water handling practices will help reduce the risk of transmission or contamination (Clasen and Smith, 2005). • Mobile water treatment purification plants like desalination plants or portable coagulation/ disinfection systems • Promotion of household level water treatment including boiling, chlorination, solar disinfection, filtration and combined flocculation or disinfection (Clasen et al., 2007).
3	Sanitation	<ul style="list-style-type: none"> • Setting up safe excreta disposal mechanism is the first line of defense against faeco-oral pathological transmission (Brown et al. 2012) • Promotion of use of toilets • Excreta removal, treatment and disposal (WHO/UN-Water 2012). • Improving household toilet usage • Promotion of safe disposal measures for children’s faeces. • Provision of toilet cleaning materials and maintenance toolkits
4.	Hygiene Promotion	<ul style="list-style-type: none"> • Promote messages targeting practices related to personal hygiene, water hygiene, domestic hygiene and environmental hygiene (IFRC, n.d.) • Promotion of handwashing at critical times to prevent faeco-oral transmission of diseases • Provision of soaps and water storage facilities through household distribution • Undertake promotion activities with children in schools • Menstrual hygiene management with adolescent and women groups • Promotion of water treatment practices at household level like chlorination, boiling, and sanitation practices such as use of toilets, cleanliness and maintenance of facilities

Annexure 2: Definitions of Resilience

No	Definition	Author and Year
1	Resilience as physical, biological, personality, social, and cultural systems' capability to effectively absorb, respond, and recover from an internally or externally induced set of extraordinary demands.	Aguirre (2006)
2	"System or community resilience can be understood as a capacity to absorb stress or destructive forces through resistance or adaptation; capacity to manage, or maintain certain basic functions and structures, during disastrous events (and the) capacity to recover or 'bounce back' after an event"	(Twigg, 2007. p.6)
3	"...the ability of a social system to respond and recover from disasters and includes those inherent conditions that allow the system to absorb impacts and cope with an event, as well as post-event, adaptive processes that facilitate the ability of the social system to re-organise, change and learn in response to a threat"	(Cutter et al., 2008, p.599)
4	b. "The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase this capacity for learning from past disasters for better future protection and to improve risk reduction measures."	(UNISDR, 2005)
5	<ul style="list-style-type: none"> • the amount of disturbance a system can absorb and still remain within the same state or domain of attraction; • the degree to which the system is capable of self- organisation; • the degree to which the system can build and increase the capacity for learning and adaptation. 	Carpenter
6	Resilience describes an active process of self-righting, learned resourcefulness and growth ± the ability to function psychologically at a level far greater than expected given the individual's capabilities and previous experiences.	Paton, Smith and Violanti, 2000)
7	Resilience is the capacity to cope with unanticipated dangers after they have become manifest, learning to bounce back.	Wildavsky, 1991
8	It is the buffer capacity or the ability of a system to absorb perturbation, or the magnitude of disturbance that can be absorbed before a system changes its structure by changing the variables.	Holling et al., 1995
9	Resilience is a fundamental quality of individuals, groups and organisations, and systems as a whole to respond productively to significant change that disrupts the expected pattern of events without engaging in an extended period of regressive behaviour.	Horne and Orr, 1998

10	Resilience is the ability of an individual or organisation to expeditiously design and implement positive adaptive behaviours matched to the immediate situation, while enduring minimal stress.	Mallak, 1998
11	Local resiliency with regard to disasters means that a locale is able to withstand an extreme natural event without suffering devastating losses, damage, diminished productivity, or quality of life without a large amount of assistance from outside the community.	Miletti, 1999
12	The capacity to adapt existing resources and skills to new systems and operating conditions.	Comfort, 1999
13	The ability to respond to singular or unique events.	Kendra and Wachtendorf, 2003
14	The capacity of the damaged ecosystem or community to absorb negative impacts and recover from these.	Cardona, 2003
15	The ability of an actor to cope with or adapt to hazard stress.	Pelling, 2003
16	Ecosystem resilience is the capacity of an ecosystem to tolerate disturbance without collapsing into a qualitatively different state that is controlled by a different set of processes. A resilient ecosystem can withstand shocks and rebuild itself when necessary. Resilience in social systems has the added capacity of humans to anticipate and plan for the future.	Resilience Alliance, 2005
18	It equates resilience with the ability to use disturbances as occasions for doing 'new things, for innovation and for development'	(Folke 2006: 253).
19	resilience is conceptualised as the ability of a system to adapt to environmental shocks and continue functioning without there being a change in its fundamental characteristics	(Manyena 2006).
20	This understanding of community resilience to disasters springs from the sustainable livelihoods approach where social, economic, human, physical and natural capital are seen as the determinants of resilience	(Mayunga 2007).
21	Social resilience is composed of components such as economic growth, stability and distribution of income, degree of dependency on natural resources, and diversity in the kind of activities/ functions being performed within systems	(Adger 2000).
22	This conceptualisation defines resilience in terms of sustainability, itself determined by the ability of users (e.g. fishermen) within a system to self-organise and reorganise to sustainably manage resources	(Ostrom 2009).
23	Resilience results from: An individual, organisation or system having a high degree of flexibility in responding to climate change, when there is large variety in the skill sets contained within the system; A substantial degree of redundancy '... of processes, capacities, and response pathways within	(Rockefeller Foundation 2009)

	<p>an institution, community, or system, to allow for partial failure within a system or institution without complete collapse' (ibid.: 2);</p> <p>Substantial planning in the preparation of identified impacts (it is acknowledged that accurately planning for future impacts of climate change is not useful but it nonetheless leads to learning and builds skills);</p> <p>A high degree of diversity of response and recovery options and a high level of decentralisation; Existence of plans for failure so that 'break-downs happen gracefully, not catastrophically' (ibid.: 2); and A number of different sectors come together to plan, execute and recover from climate- related impacts.</p>	
24	<p>It provides two complementary forms of resilience. Preparation resilience is formed of assessment and readiness and performance resilience is formed of response and recovery.</p>	(Foster 2006).
25	<p>Resilience is the ability of communities to absorb external changes and stresses while maintaining the sustainability of their livelihoods</p>	Adger 2002

Annexure 3: Methodology Matrix based on conceptual framework

Research Question	Sub-research Questions	Components	Characteristics	Potential Indicators	Description
How effectively do different approaches to water and sanitation facilities, and hygiene practices during post-disaster recovery promote community resilience?	How can learning, knowledge, and participatory approaches help in translating the window of opportunity available during recovery into action?	Learning and Knowledge	Social Learning	Safe Hygiene Behaviour	Promotion and of safe hygiene behaviour through programme interventions, hygiene messages, activities, campaigns in schools and within communities conducted by government departments, external organizations and the subsequent changes in hygiene behaviour adopted by communities.
				Socio- Cultural practices and attitudes	Social and cultural aspects relevant to health and hygiene; specific attitudes, beliefs and practices that enable communities to prevent health outbreaks post floods: e.g. Handwashing practices, safe water usage, treatment and storage practices, defecation practices, safe food handling
			Technological Innovation and Local Knowledge	Adoption of technological interventions complementing local knowledge	The outcomes of community capacity building efforts, whereby community members and informal user groups such as households, local youth, masons and builders are trained on construction of hazard-resilient measures for protecting water supplies, their operation and maintenance and safe hygiene practices building upon the indigenous knowledge within the communities.
				Documentation	Documentation mechanisms to understand, identify and promote best practices stemming from indigenous knowledge, appropriate use of technology, local adaptation and coping and coping strategies on water supply, treatment and safe excreta disposal mechanisms within the communities

<p>How can the existing policies in WaSH and recovery be strengthened to incorporate resilience in WaSH? Furthermore, how can these policies be effectively translated into practice?</p>	<p>Institutional Capacities</p>	<p>Mechanisms and Policies</p>	<p>Representative mechanisms</p>	<p>Representative mechanisms in community groups, CBOs, local governing bodies; and policies to guide proper allocation of roles and responsibilities for informed decision-making and well-defined programme objectives and their outcomes.</p>
			<p>Organizational mandate and capacities</p>	<p>Well-defined institutional mandates for disaster recovery, clear vision for resilience and presence of technical knowledge and expertise with enhanced institutional capacities to intervene and strengthen communities' resilience to future disasters</p>
		<p>Facilities and Infrastructure</p>	<p>Resource allocation and use</p>	<p>Human, technical, material and financial resources for recovery adequate to meet the institutional roles and responsibilities, such as budgetary allocation for recovery at national and local level</p>
			<p>Information and data</p>	<p>Availability of baseline information with organizations, data on existing and newly established facilities and structures, information of hazards, vulnerabilities and risks faced by the communities.</p>
<p>How can learning, knowledge, and participatory approaches help in translating the window</p>	<p>Participation</p>	<p>Community Participation</p>	<p>Inclusion and representation</p>	<p>Community led processes instituted for disaster recovery and WaSH interventions; Inclusion and representation of vulnerable groups in decision-making within formal and informal institutions, specifically addressing issues of gender, elderly, less abled and children</p>
		<p>Multi-Stakeholder Partnerships</p>	<p>Local and external collaborations</p>	<p>Local stakeholders participate and collaborate with external organizations and agree for stable partnerships such as IAGs, technical support agencies, external agencies for recovery efforts</p>

of opportunity available during recovery into action?			Monitoring and evaluation	Participatory M&E systems to assess and review effectiveness of various relief and recovery operations
How effectively do agency approaches in WaSH facilitate the integration of emergency response with long-term development across different sectors?	Integration	Linking relief, recovery and development	Programme timelines and outcomes of interventions	Programmatic timelines and involvement by agencies in response and recovery efforts of recent floods in development activities and how these led to changes
		Intersectoral Linkages		

Annexure 4: Interview guide for expert feedback

Interview Schedule

(Hello, thank you for agreeing to take part in this interview. I will begin the interview with your introduction, followed by a brief description about my research and the framework. Then I will ask your advise on each component and the indicators that I have chosen for this study.)

Name of the interviewee	
Time and Date	
Designation	
Organization (if applicable)	
Expertise-Sector (WaSH/Other)/Recovery	
Duration of the interview	
Skype or face to face	

1. A. Please tell me briefly about your experience in this sector, how long you have been involved?
B. What are the different agencies/institutions that you have worked with, in what capacity and in which countries?
2. A. Do you use 'resilience' as part of your work or in your organization's work?
B. If so, how do you use resilience and what is implied by the use of this term?
3. What do you think are the essential interventions and activities following a disaster in the recovery phase, specifically in WaSH?
4. Do agencies adopt different approaches to water, sanitation, and hygiene programming in post-disaster recovery? If so, what are they and how do they differ from each other?
5. How can WaSH efforts be improved to enhance the resilience of the communities and the systems to future disasters?

(Now, in case you have had the chance of going through the framework I sent you, I would like to go through each component and the corresponding indicator chosen for the purpose of this study. If not let me briefly give you an overview of the framework)

A. Learning and Knowledge

Would you consider **learning and knowledge** of WaSH practices to be significant in promoting resilience within the communities? If so, why are they significant?

1. How do you think can **social learning** promote resilience within the communities?
 - A. How significant are **hygiene education campaigns** and **cultural attitudes** to WaSH as relevant indicators for social learning?
 - B. How can the impact of hygiene campaigns and cultural attitudes be measured?
 - C. Do you have examples showing either the significance and relevance of the indicators or ways of measuring them?
 - D. Are there any other indicators for social learning that should be considered in this framework?

2. How can **technical innovations** in WaSH complement **local knowledge** to promote resilience within communities?
 - A. How significant are **community trainings or workshops** in WaSH and **documentation mechanisms** as relevant indicators for technical and local knowledge in WaSH?
 - B. How can the impact of community trainings and documentation be measured?
 - C. Do you know of any examples showing either the significance and relevance of these indicators or ways to measure them?
 - D. Are there any other indicators for technical and local knowledge that should be considered in this framework?

B. Institutional capacities

Would you consider capacities of institutions engaged in WaSH to be a significant factor to promote resilience within the communities? If so, why are they significant?

1. How do you think can **institutional policies and mechanisms** promote resilience within the communities?
 - A. How significant are **representative mechanisms, organizational mandates and capacities** related to WaSH as relevant indicators of institutional capacity to promote resilience within communities?
 - B. How can the impact of such mechanisms and policies be measured?
 - C. Do you have examples showing either the significance or relevance of the indicators or ways of measuring them?
 - D. Are there any other indicators for **mechanisms and policies** that should be considered in this framework?

2. How can **facilities and infrastructure** within institutions engaged in WaSH promote resilience within communities?
 - A. How significant are **resource allocation and use**, and (availability of -) **information and data** as relevant indicators of technical and local knowledge in WaSH?
 - B. How can the impact of resource allocation, use and information and data be measured?
 - C. Do you know of any examples showing either the significance and relevance of these indicators or ways to measure them?
 - D. Are there any other indicators for **facilities and infrastructure** within institutions that should be considered in this framework?

C. Participation

Would you consider **participatory approaches** in WaSH programmes to be significant in promoting resilience within the communities? If so, why are they significant?

1. How do you think can **community participation** promote resilience?
 - A. How significant are **inclusion and representation (of vulnerable groups)** in WaSH programming as relevant indicators for promoting resilience?
 - B. How can the impact of inclusion and representation be measured?
 - C. Do you have examples showing either the significance and relevance of the indicators or ways of measuring them?
 - D. Are there any other indicators for **community participation** that should be considered in this framework?

2. How can **multi-stakeholder partnerships** during recovery promote resilience within communities?
 - A. How significant are **local and external collaborations** and **participatory monitoring and evaluation mechanisms** as relevant indicators for multi-stakeholder partnerships?
 - B. How can the impact of the above indicators be measured?
 - C. Do you know of any examples showing either the significance and relevance of these indicators or ways to measure them?
 - D. Are there any other indicators for **multi-stakeholder partnerships** that should be considered in this framework?

D. Integration

Would you consider **integration** (across different phases and various sectors) to be a significant factor for promoting resilience within communities? If so, why?

- A. How significant are **linking relief, recovery and development** and **intersectoral linkages** as relevant indicators for integration to achieve resilience?
- B. How can the impact of linking relief, recovery and development and intersectoral linkages be measured?
- C. Do you know of any examples showing either the significance and relevance of these indicators or ways to measure them?
- D. Are there any other indicators for integration that should be considered in this framework?

Finally, what other factors do you think are essential for building resilience through WaSH programming during recovery?

Annexure 5: Summary report of the expert interviews – 16/05/2013

The purpose of interviewing experts in the areas of WaSH and disaster recovery was to understand how effectively different approaches to WaSH facilities and practices in recovery promote disaster resilience. It was regarding the conceptual framework for promoting resilience, which has been developed as part of my research. This expert advice was sought to help validate the framework and the indicators chosen for its main components (learning, participation, institutional capacities and integration). Practitioner's inputs on the framework and its feasibility were helpful in developing the research methodology for gathering empirical evidence.

As part of this activity around 30 experts were contacted through email seeking their participation over Skype or in person. These included practitioners from the various fields of public health – engineers and hygiene promoters, resilience and DRR practitioners and academia and also recovery experts. Of these 15 replied, 2 refused and some also provided contact details of other relevant experts.

A table summarizing the profile of those interviewed has been included.

No	Name	Duration	Expertise	Skype/Face to face
1	DA	45 mins	DM	Face to face
2	VM	75 mins	WaSH, Accountability	Face to face
3	CK	50 mins	DM	Skype
4	AB	1.14 hrs	WaSH	Face to face
5	VW	15 mins	Monitoring Expert	Face to face – Brief
6	AB	20 mins -	Resilience	Face to face – Brief
7	DL	47 mins	Water - Academic	Skype
8	RL	41 mins	WaSH Practitioner	Skype
9	PA	27+1+2	WaSH Practitioner	Skype
10	JA	55 mins	WaSH Practitioner	Face to face
11	PS	1.09 hrs+32	WaSH Practitioner	Skype
12	PB	12 +55 mins	WaSH Practitioner	Skype

Out of the 12 experts, 6 were interviewed over Skype and 6 in person (2 provided brief feedback). These were recorded and transcribed later with the help of mind maps. Mind maps were found to be very quick and easy way to depict the structure of the framework and represent key concepts that were discussed and record the time. It allows for easy retrieval and to identify themes and correlate them.

The general comments were:

1. The framework seems to be highly relevant, but there is a need to define the argument that building community resilience through WaSH is different than building resilient WaSH infrastructure.
2. Regarding the framework – Some of the examples chosen to describe the indicators are very specific to a particular type of hazard such as floods. The framework ignores multi-hazard approach majorly. And should include examples on urban/rural resilience as well.
3. The framework includes mostly development indicators nothing in it to mention that it is a resilience approach. They suggest that the focus is on the infrastructure and what is the threshold for these systems to absorb shocks.
4. Need to either include rights based approach within the framework.

Annexure 6: Informed Consent Form for Participants in Research Studies

WaSH in Post-Disaster Recovery and Resilience

If you have any questions about the Information Sheet or the explanation already given to you, please ask me before you consent to participate in this research. You will be given a copy of this Consent Form to keep for your reference.

Participant's Statement:

Please tick the following that apply:

- I agree that the research project named above has been explained to me to my satisfaction, I have read the information sheet, and I agree to take part in this study.
- I understand that if I decide at any time that I no longer wish to take part in this research, I can notify Sneha Krishnan and withdraw immediately.
- I understand that my participation in this research will be kept anonymous.
- I understand that the information I provide can be quoted in my name in the research under my name, position and affiliation
- I choose that only the name of my organization be referred to for the purposes of this research
- I am happy for this interview to be recorded and am aware of and consent to, any use Sneha Krishnan intends to make of the recordings during and after the research.
- I understand that information I have submitted will be included in a report and I will be sent a copy. I wish to remain anonymous and reference will only be made to my organisation.
- I agree that the information I provide may be used by others for future research.
- I want Sneha Krishnan to seek my approval before publishing any information I provide, in order to prevent misquotations and misunderstandings.

Name (please print): _____

Signature: _____ Date: _____

Researcher's signature: _____ Date: _____

Annexure 7: Line of inquiry

Visit 1

Rapport building

Meet Agency A/local volunteers. NGO staff where possible.

Purpose – To get a general overview of the areas and village layouts

Establish distance and access routes/ travel and cost implications

Observe people's relocation, damages due to floods, cropping.

Visit 2 - 5

Transect Walk

Identify volunteers from the communities who will agree to show us their village.

They should know the roads. Can it be the Agency A volunteers?

Could include 2 or 3 women, children when possible and men (could be difficult because men are on the fields/labor work)

The questions to be asked with the participants during the walk could include the following:

1. Number of families in the settlement
2. Their Livelihoods
3. The crops and types
4. Topography of the region
5. Landholding patterns
6. Shelter types
7. Water facilities
8. Defecation areas
9. Vulnerable zones
10. Safe places
11. Houses with latrines
12. Bathing facilities

Visit 6

Social Mapping

Steps to be followed:

1. Identify and enlist participants for the mapping exercise.
2. Explain why maps are important?
3. Who will draw?
4. Who is aware of the village layout and will help draw?

5. Please draw a map of the community settlement?
6. What are the key landmarks?
7. Which areas are affected?
8. Can you list the following in the settlements, if they exist?
 - a. Roads
 - b. Rivers
 - c. Ponds
 - d. Canals
 - e. Schools
 - f. Health centres
 - g. Handpumps
 - h. Mosques/ Temples/ Church
 - i. Post office
 - j. Panchayat office
 - k. Other Govt offices
 - l. Fields/ Farms
 - m. Forest areas
 - n. Vulnerable areas

Visit 7

a. Timeline

Year	Disaster event	Damages description

b. Participatory change analysis

- a. Use flipcharts and explain the format using images (hand-drawn) and described in local language
- b. Discuss and list down what each of them put forward into separate columns

No	Description	Before the floods	During the floods	Post floods
1	Name of the village			
2	Type of shelter			
3	Source of drinking water			
4	Place for defecation			

5	Bleaching of handpump			
6	Water storage			
7	Handwashing at critical times			
8	Garbage disposal			
9	Bathing			
10	Possession of the land			
11	Diseases			
12	Access to health care			
13	Organizational presence			
14	Other changes			

Visit 8

Household interviews (10)

Themes

1. Water

- a. Source of drinking water
- b. Water collection practices
- c. Water storage practices
- d. Water container
- e. Water treatment practices
- f. Water transport
- g. Cost of buying water (if applicable)
- h. Water handling practices
- i. Water source for other purposes
- j. Access to water points
- k. Time consumed/ travelled
- l. Who collects? Gender
- m. Ownership
- n. Service providers/ Agencies involved
- o. Alternate sources (redundancy)

2. Sanitation

- a. Defecation practices – open/controlled or communal/private/govt toilets
- b. Toilet facilities
- c. Structure of toilets
- d. Raised level
- e. Cost of facilities
- f. Expertise for construction

- g. Labor involved
 - h. Access to toilets
 - i. Ownership of toilets
 - j. Govt schemes
 - k. Location
 - l. Cultural attitudes to defecation
 - m. Gender aspects
 - n. Agencies involved in sanitation
3. Hygiene practices
- a. Water at point of use treatment
 - b. Handwashing at critical times
 - c. Handwashing facilities
 - d. Change in practices
 - e. Social constraints
 - f. Cultural attitudes to hygiene behaviour
 - g. Health promotion activities
 - h. Key messages and learning
 - i. IEC materials
4. School WaSH practices – facilities available and hygiene promotion
5. Social Learning
- a. Raised handpumps/ structural resilience – training and awareness
 - b. Training on latrine construction/ raised latrines
 - c. Local mechanisms to control spread of diseases or reduce flood impacts
 - d. Flood protection strategies
 - e. New technological inputs
 - f. Change in practices attributable to floods
 - g. Learning from peers, neighbours, relatives, organizations
 - h. Documentation – identify best practices- ??
 - i. Other aspects
6. Institutions
- a. List of organizations
 - b. Areas of work/assistance received
 - i. Livelihoods
 - ii. Shelter
 - iii. Health
 - iv. WaSH
 - c. Schools
 - d. Health centres
7. Participation
- a. Redressal of issues at the Panchayat level/Block level
 - b. Participate in another organization
 - c. Voice of vulnerable groups
 - d. Decision-making in the village
 - e. Women's/ Youth groups
 - f. Dependent on – friends/ relatives/ others

- g. Social networks
- h. What assistance? Land/Shelter/Utensils/Money/Food
- i. Compensation of the assistance
- 8. Integration
 - a. Linking relief, recovery and development
 - i. Fluctuating populations
 - ii. Changing needs
 - iii. How are they met?
 - iv. How can they be sustainable?
 - v. Availability/access and use of resources
 - vi. Management of water source
 - vii. Latrine operation and maintenance
 - b. Sectoral integration
 - i. Other major needs currently
 - ii. How can they be integrated?
- 9. Migration
- 10. Relocation/ resettlement
- 11. Shelter

Visit 9

Actor mapping

Visit 10

Group discussions – Problem identification and priorities

Steps to be followed

1. Explain the purpose of this exercise and what can be achieved
2. Discuss the problems and describe their impacts during post disaster recovery
3. List out all the priorities
4. Ask them to prioritize which ones are important based on their order of significance
5. Discuss the following with the community members:
 - a. How has the situation changed from the times before the 2012 floods, and has there been an improvement or become worse?
 - b. How would you ensure that we could become more resilient to future floods?
 - c. How could we strengthen our water sources and shelters and latrines to become more resilient?

Other officials to be met:

No	Description	Sonitpur	Morigaon
1	District collector	1	1
2	Local NGO chief functionaries	4	4
3	Other organizational staff	5	5
4	Block development officer	1	1
5	Public Health Engineer	1	1
6	Public health dept	1	1
7	Rural drinking water	1	1
8	Health centres	3	3
9	Education Dept	2	2
10	Block Education Officer	1	1
11	School teachers/ Headmasters	5	5
12	Anganwadi workers/Auxillary nurse midwives/ Multiple Purpose workers	5	5
	Total	30	30

Questions for above actors:

1. District Collector/ Block Development officer
 - a. Introduction
 - b. What is the nature of hazards prevalent in the district?
 - c. Can you please describe the process of recovery in the district and what are the challenges?
 - d. What measures are undertaken to develop resilience of the people and systems to the recurrent nature of floods and erosion?
 - e. What are the various needs that emerge during disaster recovery in such a situation?
 - f. What are the challenges faced in WaSH during post disaster recovery given the situation?
 - g. What are the policies to direct financial and other allocation of resources?
 - h. Are there any mechanisms in place to increase learning within the administration? If so what are they?
 - i. What is the scope for increased participation to increase resilience?
 - j. How can we encourage various organizational involvements and increase their capacities to be involved in recovery and rehabilitation?
 - k. How can we integrate the recovery process across time and different needs then to achieve resilience?

- I. What in your perspective needs to be done to improve and increase resilience of the people in the district?

Pointers for Photo-documentation

Photographs showing

1. Water source – open or handpumps (raised or sunken or damaged)
2. Shelter types (Agency A or self-built/ pukka or kaccha)
3. Latrine (if present – private/ communal or Agency provided materials)
4. Bathing facilities (if present)
5. Open defecated areas
6. Sewage
7. Water storage
8. Handwashing observational behavior at household or schools
9. IEC materials

Annexure 8: Tools used in Assam and Odisha (Source: Manyena, 2009)

Name of the tool	Purpose	Risks	Opportunities
Site visits	Get a first hand impression of impacts and scale of destruction, provides a chance to interact with the communities, observe and document the experiences. This is the primary and most important step to access and familiarise with the villages. Visit local offices, schools, health centres to get overall picture of hazards, health and hygiene status	Transaction and time costs involved are huge, logistics of reaching the village had to be arranged. Depending on public transport and then walking affected time allotted to field work. Visiting the villages during floods also a challenge as most areas remain waterlogged/washed away due to erosion	Provides the accurate picture of the village and establishes a connection with frequent visits. Visually see the impact and magnitude of the disasters and living conditions of the people
Rapport building	Make local connections and identify key informants from the communities. To get a general overview of the areas and village layouts; Establish distance and access routes/ travel and cost implications Observe people's relocation, damages due to floods, cropping.	Access to communities through agencies influences the role of the researcher affecting the objectivity and impartial of data gathered	Communities get to know the researcher better, understand the background and trusting relationship is formed eventually
Transect walk	Walk with the local volunteers and community members - women, children and men. Observe	Due to size of the villages, covering all settlements and exploring the length and	When accompanied by locals this tool proves useful to discuss various

	their village, and discuss with them about the geographical layout, hazard impact and scale, demographics, water points, defecation areas and safe spaces. Also look out for houses with latrines and bathing facilities, and overall hygiene practices	breadth of the village becomes difficult. Sometimes eroded villages means there is population displacement.	issues they face and observe their practices
Village mapping	Map the general layout with local population identifying the settlements, water sources, important buildings and vulnerable areas. Also note the defecation areas and drinking water sources such as handpumps.	Pre-planning the activity so that researcher can carry necessary aids, may not be the accurate scale of depiction	When done by children, can find out about what is the practice at their household level and gives real picture, they have fun while drawing as well
Problem ranking	List the current needs and problems faced by the community. Describe how these problems affect the community members, and list the priority urgent needs amongst all. The community then prioritises based on the order of significance and requirements such as shelter, drinking water, sanitation facilities, livelihood opportunities etc.	Often difficult to get a consensus on different perspectives based on income, gender and access to resources	Very useful and informative exercise. To understand at what stage of recovery the community is at the present stage, what are their current needs and priorities? Should be ideally undertaken with representative groups – men, women, and children.
Focus group discussions	Most field visits would culminate in focus group discussions or community consultations, where	Pre-determined protocol for discussions restricts the scope for useful and valuable	Best tool to get a wider consensus on issues faced by the community at

	<p>the members – men or women would gather to provide me with information I am looking for. The common areas that I would discuss them would include different aspects of recovery, the assistance they received, how has floods changed/transformed their day-to day lives, WaSH, infrastructure and other development concerns, how do they perceive resilience and what steps can be undertaken.</p>	<p>discussion, best to keep it free-flowing and let the community members voice their feedback. Always leads to expectation of some kind of help but due to lack of adequate resources to support as action research was a huge risk of using this tool</p>	<p>large, often came up with solutions that they wanted to be implemented, the challenges they faced and how these could be overcome. Issues of menstrual hygiene, hygiene behaviour and privacy concerns over use of water and latrine facilities were discussed with women groups. Children provided inputs as well on WaSH practices and facilities in schools and households.</p>
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Annexure 9: Interview Guide – Organizations

(Hello, thank you for agreeing to take part in this interview. My name is Sneha Krishnan and I am undertaking research on building community resilience during post disaster recovery specifically in water, sanitation and hygiene in Assam. Hence I would like to know more about your organization and the work undertaken. Kindly feel free to ask for any clarification or elaboration of any questions that I may ask you)

1. Name of the interviewee	
2. Time and Date of the interview	
3. Duration of the interview	
4. Organization	
5. Designation	

A} Organization Overview

1. a) Please tell me briefly the organization's experience of working in this region.
- b) How long has the agency been working here?
- c) What are the different disaster responses that the agency has been involved in so far?
- d) What disaster phases does the organization work in? Is disaster recovery a priority?
- e) How was the organization involved during the 2012 floods in Assam? What sectors were addressed within the response?

B} Vision and Mandate

2. What is the organizational vision for disaster resilience?
3. How does the work done by the organization contribute to community resilience?
4. What is the mandate of working in humanitarian sector, particularly in disaster recovery and rehabilitation?
5. How do you think was the emergency response work done by the agency useful in addressing needs of the communities for long-term sustainability?

C) Specific Expertise and Capacities

6. What is your experience of working in water, sanitation and hygiene practices in the post-disaster phase in Assam?
7. What is the technical expertise held within the organization in terms of human resources and experience in
 - a) Disaster recovery and
 - b) WaSH?
8. What kind of training and skill-building exercises specific to disasters and sectors do the staff receive? What do you think are the gaps in building their capacities?

D) Learning and Knowledge

9. How would you describe the local attitudes and community practices to WaSH, which are prevalent in these areas?
10. Did your organization undertake interventions to promote safe water, safe sanitation and hygiene practices? What were they
11. How effective were these interventions in leading behaviour change and/or building systems' resilience? What were the challenges faced in effecting this behaviour change?
12. Particularly in WaSH sector, are you aware of instances where technological interventions complementing local indigenous knowledge were useful in the regions of Assam for building disaster resilience?
13. Has the organization undertaken efforts to review and learn from the previous experiences in post disaster work? If so, what are they and how have they been incorporated?
14. Are there instances where local collective action in WaSH was formalised into the institutional policies for future programmes?
15. How can such local level coping and adaptive strategies be formally/informally documented for understanding community resilience?

E) Institutional Capacities and Participation

16. Generally, what is the male/female ratio of your staffing?

17. What is the scope for local representation within your organization?
18. How are the roles and responsibilities delineated within the organizations? Are they flexible?
19. How does the work done by the organization present local action to the policy makers?
20. What role does advocacy play in the organization's work?
21. How does the agency plan and allocate resources to work in recovery and reconstruction?
22. How important is community participation as a component of the organization's projects at various phases?
 - a) During design phase
 - b) Planning and operational phase
 - c) Monitoring and evaluation phase
23. What are the challenges that the organization has faced in ensuring equal participation and how did you overcome these?

F) Information management and Collaborations

24. What systems of information collection and dissemination, are being used while engaging with communities?
25. Is the organization part of a network/consortium of NGOs?
26. Do you partner with NGOs, government agencies, for-profits for your projects at district/state or national level?
27. How would you describe the efforts undertaken by such networks as contributing to disaster resilience objectives?

G) Integration

28. Before concluding, could you please describe how can recovery objectives be addressed during the various stages of the organization's work?
29. What according to you are the most important aspects to build resilience within the communities?
30. With regards to WaSH, what measures can be undertaken to achieve disaster resilience in the systems and communities?

31. How can objectives of safe water and sanitation, and hygiene practices be integrated with the work that your organization is undertaking in other sectors? What are the potentials for achieving these and challenges?

Thank you for your time. Please feel free to give me any feedback.

Annexure 10: Sample of a Mind map



Annexure 12: List of documents used

Type of documents	Assam	Odisha
Government documents	30	40
Agency A documents	25	45
Agency A email communications	10	30
Other NGO documents	15	10
Journal articles	50	25
Newspaper articles	200	180
Published reports/studies	50	15
Unpublished reports	15	10

Annexure 13: District Maps

Figure 1: District map of Sonitpur, Assam (Maps of India 2007)

Figure 2: District map of Morigaon, Assam (Maps of India 2012)

Figure 3: District map of Puri, Odisha (Maps of India 2013b)

Figure 4: District map of Balasore, Odisha (Maps of India 2013a)

