Building Community Resilience through Water, Sanitation, and Hygiene Programmes during Post-Disaster Recovery

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Abstract

Repeated occurrences of disasters pose a huge threat to community and infrastructural resilience. Hence recovery processes should go beyond the traditional notion of bouncing back and restoring normalcy, and should strive for a change or transformation, which will prepare the affected communities to face future hazards. This study particularly looks at the different approaches in water, sanitation, and hygiene in post-disaster recovery to promote disaster resilience and assesses their effectiveness. Using the case study approach, evidence is gathered from the recent floods in Assam, India in 2011. A resilience framework conceptualised through a literature review, and with input from experts through qualitative interviews, will be validated using a set of indicators through an empirical study that was conducted over visits at three different periods of time. The first two visits were conducted for an emergency assessment and a scoping study during the early recovery phase. The participatory appraisal tools were used for collecting information through affected members of the communities and various stakeholders and were complemented using documentation through photographs and field notes. The preliminary findings based on brief visits to the study site so far have highlighted water, sanitation and hygiene (WaSH) as a critical need and priority during the emergency, early recovery and longer-term recovery efforts. Some of the structural measures undertaken include installation of new tube wells over the flood-levels, construction of latrines, construction of raised flood platforms while reconstructing previously damaged hand pumps, increase of the plinth level, and non-structural measures under hygiene promotion include promotion of the use of latrines, hand washing, safe food hygiene and water hygiene practices. The processes followed in villages that are frequently flooded were found to be inclusive, leading to learning and integration. Additionally, through institutional capacity building, recovery processes could potentially lead to transformational changes.

Keywords: Disaster Recovery, Water, Sanitation, and Hygiene Programmes, Community Resilience.

Introduction

Post-disaster recovery is a complex, non-linear, time-consuming, and multidimensional process that occurs within the given context of socio-economic development (Davis, 1978; Mileti, 1999; Quarantelli, 1999; Rathfon, 2010). It is shaped by existing political and structural conditions (Wisner et al., 2004). Recovery provides a number of opportunities and challenges to engage and implement sustainable development and disaster risk reduction

initiatives (Christoplos, 2006). Repeated disaster occurrences pose a huge threat to community and infrastructural resilience and hence recovery processes should go beyond the traditional notion of bouncing back to restore normalcy and strive for a change or a transformation that will prepare the affected communities to face future hazards. Therefore, disaster resilience - the intrinsic capacity of a system or a community to bounce forward and adapt in order to survive by changing its non-essential attributes and rebuilding itself -- should be enhanced (Manyena et al., 2011).

Often, disaster events are followed by the spread of water-related diseases, depending on the environmental conditions and human behaviour that determine control and prevention of diseases (Connolly et al., 2004). Therefore, water, sanitation, and hygiene (WaSH) interventions are significant from public health and emergency response efforts perspectives. However, there is insufficient evidence of what innovations work in the emerging processes, technologies, and approaches that are redefined for WaSH service delivery following any disaster (Brown et al., 2012). There is a need to identify the scope for promoting disaster resilience within the communities, including the systems and the structures, specifically focusing on water, sanitation and hygiene. This study particularly looks at the different approaches in water, sanitation, and hygiene in post-disaster recovery, which can promote disaster resilience and assess their effectiveness using a resilience framework. This framework is derived from a critical review of existing literature and primary investigations in the field in Assam, India following the floods in 2012. The initial investigations were later further developed by repeated site visits to complete the case study. Experts' opinions on the conceptual framework were sought through semi-structured interviews on the chosen qualitative indicators and their relevance in practice and programming. These were assessed and explored using participatory learning and action (PLA) tools and techniques and semi-structured interviews with key informants. Therefore, this paper presents the conceptual framework and some initial findings, which are part of the doctoral research project. The main conclusions put forward are that learning, participation, institutional capacities and integrated approach towards WaSH programming in post-disaster recovery should facilitate enhancing the communities' resilience.

Towards Holistic and Transformative Recovery

The idea of a complete and holistic recovery remains an ideal vision unless the root causes and symptoms of disasters are tackled (IFRC, 2001). The task of rebuilding, replacing, or improving upon what was lost during the disaster takes years and a huge amount of time and resources, which is supported by the use of enormous local and external resources (Lizarralde et al., 2010) and the capacity of those involved in the process. Research shows that the local stakeholders, including state governments, civil society organisations and local communities should have more influence on the approaches and outcomes from reconstruction (Barenstein, 2010).

A key question that often gets lost in all the debates and chaotic pos-disaster atmosphere is "*Whom do we build back better for*?" Although recovery provides an opportunity for 'transformation,' the nature and scope of this change is rarely documented or evaluated with original objectives, emerging needs, and changing goalposts (Christoplos et al., 2010). Focus during reconstruction is mainly on housing and shelter provision (da Silva, 2010; Jha et al., 2010). However, the right to water supply, sanitation facilities, medical and health services for treatment and appropriate hygiene practices are equally important (Barakat, 2003) and very much underemphasised in the literature on post-disaster recovery. Most measures undertaken in WaSH during recovery remain *ad hoc* and are rarely documented. There is a huge research gap, where there is little evidence of what different approaches to WaSH exist during recovery and how these promote resilience.

Focussing on Water, Sanitation, and Hygiene Programming

Ensuring equitable access to water, sanitation, and hygiene services is a development priority. There are more than 780 million people lacking basic access to drinking water, almost 1.1 billion people lacking access to safe and basic sanitation, and 2.6 billion people lacking access to improved and adequate sanitation facilities (Unicef/WHO, 2012). Essentially, water and sanitation services form the bedrock of international development cooperation and key indicators that determine progress on global Millennium Development Goals (Tipping, 2006). The spread of water-related diseases depends on environmental conditions and human behaviour that determines control and prevents diseases (Connolly et al., 2004). Within the conditions following any disaster, changes in disease transmission pathways, influx of population and decreasing individual levels of resistance to diseases due to inadequate food consumption, unsafe environmental health surroundings, affected populations are more susceptible to diseases (Sphere, 2011).

Brown et al. (2012) note that there is a huge gap in WaSH programming, where further research is needed for a new and innovative technology that will help make WaSH response more effective. The need for improved WASH strategies for emergency has led to the development of new approaches by relief agencies, but there is insufficient evidence of what innovations work in the emerging processes, technologies and approaches that are defined for humanitarian WaSH service delivery (Brown et al., 2012). There exists a lack of systematic evidence of what works effectively and huge research gaps in terms of advancing technological developments and providing solutions for emergencies. These gaps are further magnified during the recovery phase, when attention is diverted to restoring damaged houses and rebuilding shelters and livelihoods. Indeed, basic services such as WaSH and other environmental health concerns are often put on the backburner.

The Resilience Framework

The term “Building Resilience” has become the main principle of 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). The term resilience is derived from ‘resiliere’, which means ‘to bounce back’. From this perspective, people affected should be able to bounce back within the shortest possible time with minimal or no external assistance. Cutter et al. (2008) reviewed many published studies and described resilience as: “...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).

For the purpose of this study, disaster resilience is seen as the ability of communities, and their systems, infrastructure, services, and institutions (WASH systems and infrastructure, within the community and institutions) to maintain their basic functioning in the event of a setback occurring on a regular basis. Therefore resilience is based on their mutually inclusive inter-linkages that enable the effective use of the opportunities to determine the process of improving or at least restoring conditions over a period of time, holistically fostering their development with or without external assistance. The following framework builds on the comprehensive work undertaken in the guidance note developed by Twigg (2007). The note provides a list of the characteristics of resilient communities based on the Hyogo Framework of Action (HFA) (ISDR, 2005) and defines components of resilience (Twigg, 2007). The conceptual framework uses themes derived from the recovery and WaSH literature to pick relevant components from the guidance note and adapts it for the purpose of this study. This framework is represented in figure 1.

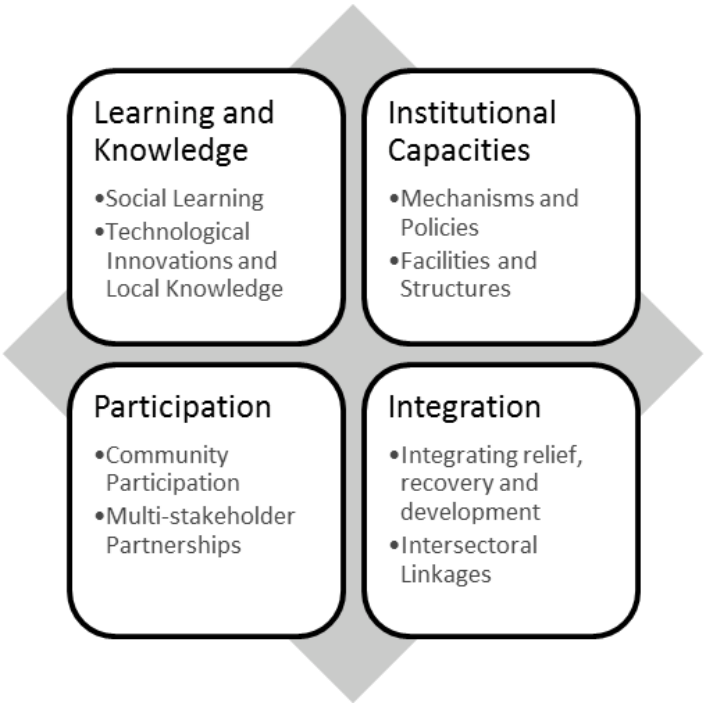

Figure 1: Conceptual framework for promoting resilience in WaSH during recovery. Source: first author.

i. Learning and Knowledge: Social Learning, Technological Innovations and Local Knowledge

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). Societies learn how to develop change management strategies and learn from past disasters. Reviewing past changes, learning from them and suggesting a systematic structure on how to capture and account for change is a key aspect of promoting resilience. And these forms of social learning, as Manyena (2009) notes, are often manifested in policy guidelines, organisational decision-making, and pre-disaster preparedness measures. This provides the ground for further learning and making corrections in order to improve the organisational practices and decision-making abilities. There are various forms and examples of attempts for learning at organisational, institutional or community level such as trainings, workshops, and on-the job experience for various community actors (Manyena, 2009, p. 59).

Post-disaster changes are normally accomplished through social learning and self-organisation to enable technological evolution, new information exchange and informed decision-making. Local successful cases of best practices and effective outcomes of resilient approaches have the potential for upscaling by government action or replication (Pelling, 2011, p. 56). Local knowledge comprises the totality of perceptions, beliefs, understandings, and skills that one or more members of a community use or can potentially use to communicate about and manipulate the physical and built environment (Wisner, 2009). This knowledge could be within the community – generally about hazards, frequency and early warnings and local mechanisms for coping, and specifically about practices for collecting water, defecation and existing practices and service delivery mechanisms.

ii. Institutional Capacities: Mechanisms, Policies and Facilities

Organisations and institutions that are involved in strengthening resilience are classified as either formal or informal institutions (Pelling & High, 2005). These include regional, national, sub-national and local and international institutions and organisations, including Non-Governmental Organisations (NGOs), Community Based Organisations (CBOs), Civil Society Organisations (CSOs) and informal community groups. There are technical organisations that provide expertise and support, academic and research organisations and forums for discussions. Resilience building can be targeted at different scales such as regional, national, sub-national and individual levels depending on the objectives, magnitude of the issues to be addressed and availability of resources. Establishing such institutions that provide facilities to communities, technical expertise and build community capacities will be helpful in learning, adapting and promoting disaster resilience (Manyena, 2009).

iii. Participation

Local representation, participation of communities and other factors that influence decision-making within agencies can be useful indicators for evaluating access and learning within the institutions. Community involvement in reconstruction programmes enhances their resilience by strengthening physical, emotional, practical ability to resist disasters and facilitating reconciliation, improving institutional resources and developing social capital (Barakat, 2003). Twigg (2006) argues that participatory processes involving vulnerable people and disaster victims helps identify needs and prioritise urgent needs and vulnerable groups. This can help in integrating traditional methods with new technological inputs, so that that local needs, resources and cultural practices are reflected in the technological choices (Twigg, 2006).

iv. Integration: Integrating Disaster Recovery with Response and Development; Inter-sectoral linkages

The concept of disaster resilience is closely tied to the integration of various sub-systems for increasing functional persistence and ensuring redundancy within the system. The HFA calls for inclusion of DRR principles in post-disaster recovery and rehabilitation and for the use of opportunities during the recovery phase to develop capacities that reduce disaster risk in the long-term, including through the sharing of expertise, knowledge and lessons learned (ISDR 2005, p. 11). These linkages between disaster relief, recovery and development can be achieved through policy frameworks, decision-making guidelines.

Another key theme that emerged from the literature review on disaster recovery was that the reconstruction of houses, shelter programmes, economic restoration and sustainable livelihoods approaches are of paramount importance. This is a broader approach than just concentrating agency efforts on housing, shelter, livelihoods, or market economy, so that other sectors are not ignored or under-developed. Other critical services and sectors too should be given adequate attention for ensuring a holistic recovery of communities including education, schools, public health and WaSH systems. Therefore an integrated approach looking at multi-sectoral recovery is essential to understand recovery at the household level.

Methods

The overarching methodological approach adopted for this study is the case study method. It proves useful for exploring the existing WaSH programmes and approaches during recovery and in determining how resilience can be promoted. Resilience thinking was used to develop the above conceptual framework, which is validated by collecting empirical evidence. The major question asked in this study is: *How effectively do different approaches to water and sanitation facilities and hygiene practices during post-disaster recovery promote a community's resilience to disasters?*

The case study data collection is supported by a literature review of projects and literature from the region. It is consolidated over three visits to Assam at three different times – during the floods, during early recovery stages and another extended field study for empirical data gathering. Key informant interviews and participatory research tools such as group discussions, mapping, and issue ranking with the communities were used. The first visit was to undertake a needs assessment for a brief period immediately after the floods happened in July 2012. Another scoping study was undertaken in 2013 to understand the existing early recovery processes using tools such as transect walks, household visits, stakeholder interviews, community consultations, mapping, issue ranking as well as photographs taken during site visits. The third visit took place from July 2013 – October 2013.

In order to validate the framework, ten qualitative interviews were undertaken in 2013 with some expert practitioners and academics in the field of disaster recovery or water, sanitation programming and disaster risk reduction experts. These interviews were useful in providing an overall perspective of what actually works in WaSH programming in disaster recovery with specific feedback and suggestions on the framework and relevant indicators, and how to measure them in the field.

Context

Assam, a northeastern state in India, is situated in a high rainfall area with an average annual rainfall of 2,546 millimeters. The Brahmaputra river basin, and especially the Assam valley, is extremely prone to floods, characterised by regular erosion and devastation during monsoons. In June 2012, a 28 % increase in rainfall was reported, leading to water level rise and around 43 reported breaches of embankments on the Brahmaputra and 14 of its tributaries (IFRC, 2012). Subsequently, there were two more flood waves that affected the areas as shown in figure 2.

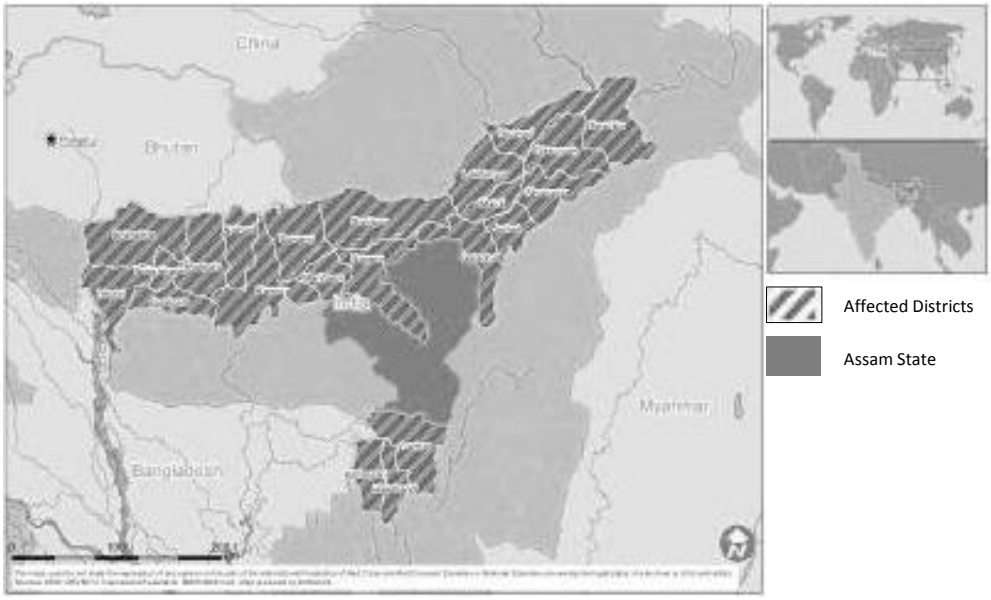

Figure 2: Affected areas in Assam floods. Source: IFRC, 2012.

The relief and recovery process was initiated within the human development and geopolitical context of the northeastern region of India. Given this scenario, a sample of 2 communities from village development blocks belonging to different districts in Assam were studied, based on how frequently they are affected by floods, what initiatives are undertaken for the recovery process and what activities by external agencies such as Oxfam India and its

partner NGOs could enhance the resilience of the communities with respect to water and sanitation facilities and hygiene practices. This empirical evidence will help validate the framework and contribute to regional programming policies and development planning.

Initial Findings

The preliminary findings presented in this paper are based on the initial needs assessment undertaken during the floods in 2012 and a follow-up scoping study conducted in 2013. These highlight the impacts on WaSH services and facilities, and emerging needs in WaSH as a grave concern in relief and early recovery.

During the emergency phase it was found that:

- Almost all the sources of potable water (ponds, open wells and shallow tube-wells with hand pumps) were inundated, contaminated or not functioning and were being used by the communities without any form of treatment.
- Poor hygiene practices like open defecation coupled with improper water storage and handling further deteriorated the problem.
- There was an immediate need for improved access to WASH facilities, mainly drinking water (installation/improvement of water points, treatment, and storage) and hygiene promotion activities; including basic chemical and biological testing (such as arsenic, fluorides and nitrates), to check the current and long-term appropriateness of drinking water sources.
- The consumption of contaminated water (particularly the use of floodwater) was putting the affected families, especially children, at a substantially higher risk of water borne diseases and other sanitation related ailments.
- A general lack of proper containers/ pots to collect or store water, coupled with poor hygiene awareness and practice, was creating a negative impact on health and sanitation in the affected areas.

The villages can be classified as follows based on their location and destruction faced by them and the current context, as observed in one of the agency reports (Chotani, 2013):

Tier 1 - Those villages that are located within 500-1 km distance from the river. Most have lost their land for housing and farming, or the land is under less than 2 feet of sand, and their homestead is under high exposure to floods in the future. They have suffered complete losses (land, home, animal and other assets);

Tier 2 - Those villages that are less than 800 meters away from the breached embankments and their fertile lands are up to 2 feet of sand. Damages to homestead and loss of assets (animal and other types) are less, but still there is an adverse impact on livelihoods;

Tier 3 - Those villages that are 2 or more kilometers away, but the intensity of floods has damaged their standing crops, resulting in a loss of livestock. Most were able to retain their land for housing and farming purposes, but have lost most belongings as they were washed away during the floods (Chotani, 2013).

During the recovery phase, it was found that few international organisations were involved in providing support to the communities to recover and rebuild themselves post the emergency phase. Based on immediate emerging needs, and the recurring flood waves, it was necessary to continue working in the recovery phase. This would enable the communities to rebuild their lives and find external financial assistance and support in most aspects of WaSH, shelter, livelihoods, food security and nutrition for initiating early recovery. These major agencies were involved with local partners in providing recovery support through enhanced local participation, capacity building efforts, providing cash inputs for the local

economy, and providing opportunities to the affected communities for regaining their shelters and livelihoods.

The activities focusing on emergency WaSH response included distribution of hygiene kits, water storage containers, and tarpaulin sheets as well as hygiene promotion campaigns in the affected villages, temporary settlement and relief camps, sanitation facilities provision, water quality monitoring and treatment, disease surveillance, home visits, and so on. Some of these activities were continued under the recovery phase. Additional components that were included in the recovery phase were rehabilitation of the water sources, additional increase in latrines facilities, installation of WaSH facilities (latrine with hand WaSH facilities, bathing units for women) in raised flood shelters (constructed under cash for work), rigorous hygiene promotion by using different methodologies for different age groups, capacity building of the first responders in the villages (government health workers, community workers under the social welfare department) in hygiene promotion during emergencies, disease surveillance, and government coordination. It was important to educate affected communities about where they can get the services from relevant government departments when they need it most and also to inform government service providers about the situation on the ground in order to bridge the gap between service providers and service receivers.

The support received from external NGOs and government agencies enabled the existing development processes and incorporating disaster risk reduction measures, particularly in WaSH. Some of the structural measures included installing new tube wells over the flood danger level, construction of latrines, raising platforms while reconstructing previously damaged hand pumps, and increasing the plinth level. Non-structural measures under hygiene promotion included promoting the use of latrines, hand washing, safe food hygiene and water hygiene practices. The processes used in villages that experience frequent flooding were inclusive of local communities at various stages, such as site selection, planning and implementation by engaging local masons and labourers for operations and maintenance training and skills building.

Analysis

The conceptual framework adopted for this study and its thematic components, which include learning, inclusive approaches, strengthening institutional capacities, resources and integration across sectors and phases were found to potentially lead to transformative recovery and enhanced resilience.

Learning and knowledge encompasses two aspects: social learning and technological interventions complementing local knowledge. The chosen indicators are hygiene and health education campaigns, cultural attitudes and beliefs, community capacity building and documentation mechanisms. Hygiene education campaigns were undertaken post-disaster to promote good health practices and improve the hygiene practices in the communities to check the spread of outbreaks. These were undertaken by the NGOs to promote basic practices such as hand-washing, safe water and food hygiene practices. The understanding of the cultural attitudes and behaviour of the communities with regard to water and sanitation hygiene was useful in developing feasible strategies for sensitising and motivating people based on their needs.

Under technological processes and local knowledge resources, some community capacity building efforts, such as trainings or workshops, were undertaken that promoted the use of reinstalled tube wells on raised platforms, and latrine facilities. Efforts were also taken to train the community members and informal groups such as households, local youth leaders, masons and builders in the construction of houses using disaster risk reduction measures, construction of elevated platforms for community shelter, flood protection measures for water

supplies, their operation and maintenance and safe hygiene practices. These efforts complemented existing local traditional practices for construction and used locally available materials. Thus, the indigenous knowledge was incorporated into the community recovery planning and implementation. To what extent these activities have translated into change in practice, however, needs to be documented and studied empirically.

Institutional capacities are further divided into mechanisms and policies within organisations involved in the recovery process as well as the facilities and infrastructure. Representative mechanisms, organisational mandate and capacities, resource allocation and use, information and data are useful indicators of institutional capacities.

Representative mechanisms instituted within community groups, local NGOs, and community organisations provide a holistic perspective to inform policies and decision-making within formal and informal institutions. Besides these, investigating the institutional mandates, visions, and capacities in technical knowledge and expertise of disaster resilience, disaster recovery and WaSH could prove beneficial for strengthening WaSH systems' resilience. Adequate resources in terms of human, technical, material and financial resources and capacities for effective recovery programming are necessary to fulfill these mandates and objectives. Having an inventory of available resources, baseline information of health and other services, data on existing and newly established facilities and structures such as raised handpumps, or toilet facilities would result in effective and informed decision-making.

Participation includes community participation and multi-stakeholder partnerships, which further incorporate inclusive mechanisms for the selection of beneficiaries within local communities. Such community- led processes for disaster recovery and WaSH interventions that were instituted at the local level were found useful in addressing the needs of the vulnerable groups in decision-making based on caste, gender, age and ethnic representation with the help of village development committees, user groups of water and toilet facilities or school management committees are a few examples of such processes.

Integration includes linking relief, recovery and development and inter-sectoral linkages across shelter, education, health, livelihoods and WaSH during recovery. It is necessary to explore the programmatic timelines and involvement by agencies that are engaged in response and recovery efforts. Recurrent floods also impact development activities of the institutions often leading to changes in their programme initiatives. The early recovery programme by Oxfam India addressed three major needs emerging from the field post-emergency. These included shelter and livelihoods, water and sanitation. Hence, a holistic and integrated approach across sectors and phases would promote resilience, rather than adopting a fragmented approach for responding to the floods.

Conclusions

The key essential lessons that can be drawn upon from the preliminary research stages in Assam are that for achieving recovery - water, sanitation and hygiene are important priorities, along with shelter, livelihoods and others. Promoting community resilience during recovery particularly in WaSH can be understood to mean:

1. Enhancing the resilience of water/sanitation systems and hygiene practices to future/secondary water-related hazards through an overall stronger infrastructure for water supply, storage, treatment facilities and sanitation systems.
2. Strengthening various institutions engaged in WaSH systems through learning, increased participation, capacity building and integration with other sectors.
3. Providing opportunities for learning within communities and organisations through

technological innovations, and integrating with local needs, practices and knowledge for linking relief, recovery efforts to longer-term development, and using a risk reduction approach.

Hence, one may deduce that relief, recovery and development objectives should be incremental and promote holistic growth and development and lead to a better-transformed society for the communities to exist and function. To conclude, community capacities, organisational mandates, resources and expertise (to understand the local context and respond to the emerging needs with foresight and appropriate planning as well as sector-specific expertise to design and build stronger and more resilient infrastructure at safer locations through community-led processes) are instrumental and essential features for promoting resilience within post-disaster communities.

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Dr John Twigg is a Co-Director of the Centre for Urban Sustainability and Resilience at University College London. His research into disaster risk reduction crosses the disciplinary boundaries between engineering, planning, geography, sociology and psychology. Specific research interests include community resilience, post-disaster recovery, vulnerability assessment methodologies, and disability and disasters. The application of academic research to improve operational practice is of particular interest. He has more than 50 publications on disaster risk reduction and sustainable development, and is an editor of the journal *Disasters.*

Cassidy Johnson is a Senior Lecturer at the Bartlett Development Planning Unit, University College London. Her interests are in urban risks, recovery and reconstruction and how communities and governments can prepare urban areas to be resilient to and respond to crises and disasters. She is currently undertaking research on urban risk in four African countries. She has done research on post-disaster temporary housing - particularly looking at disaster recovery in Turkey and on urban rehabilitation and Roman communities in Istanbul. She is a founding member of Information and Research for Reconstruction Network (i-Rec) and is currently chairing the Urban Planning Advisory Group for UNISDR.