International Journal of Social Sciences (IJSS)
Vol. 1, No. 4, Autumn 2011

Enhancing Community Resilience to Floods in Iran: The Case of Post-Disaster Neka

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Received 22 June 2011
Revised 11 August 2011
Accepted 12 September 2011

Abstract: *The frequency and impacts of floods have increased in Iran in the past few decades. As flood events are in most instances associated with human activities, mitigating their impacts requires non-structural and community-based initiative alongside structural measures. In this connection, the concept of community resilience has been advanced in recent times, which attaches importance to interactions among the largest group of stakeholders, collective memory and thinking, vertical and horizontal networks of cooperation and coordination, and pluralistic and flexible structures. Focusing on the case of post-flood Neka in the Caspian coast, this article highlights the need for a community resilience approach to addressing disasters in Iran. After describing the resilience concept as well as the Neka flood, results of a set of group interviews conducted with key public-sector stakeholders in the Neka basin several years after the event are analyzed. The main question is to what extent the major flood event in Neka gave impetus to building a resilient community structure. Findings indicate that, due to the major flood event, the knowledge and willingness of both public-sector actors and community members were enhanced, resulting in a resettlement program as well as efforts to prevent flood zone encroachment and sand and gravel mining. Yet, these were only prerequisites for enhancing community resilience which would require coordinated activities initiated by the public sector with short-, medium-, and long-term resilience-enhancing goals and outcomes.*

Keywords: *disaster mitigation, flood, community resilience, community-based activities, Neka, Iran.*

Introduction

The frequency and impacts of floods have increased globally and in the Middle East in the past few decades (United Nations, 2011). In Iran, damages caused by floods have exceeded those of other man-made and natural disasters and have been on a steep rise in recent times. In a report prepared by Iran's Ministry of Energy (1996), the results of several unpublished studies are cited on the frequency of and damages caused by floods in the country. According to older sources referred to in that report, an annual average of 40 minor and major flood events occurred in Iran – resulting in 1,890 events between 1952 and 1991 that affected 625 cities. Damages caused by floods during this period are estimated as 1,250 billion Iranian rials. Based on another unpublished study conducted by Mohammad Mahdavi of the University of Tehran, between 1971 and 1996, floods caused a total of 9,162 billion rials worth of damages in Iran or 366.5 billion rials on an average annual basis. Furthermore, human losses due to these floods totaled 1,882 or 75 persons per year on the average. According to yet another cited study prepared by the Coasts, Ports, and Rivers Engineering Bureau of the Ministry of Energy, total flood damages between 1952 and 2001 may be estimated as 30,880 billion rials. Needless to say, the above damage figures would be much larger if converted to current rials.

Floods are to a large extent predictable and therefore different from many other natural disasters. Furthermore, the impact of floods is often intensified through the changes made by humans to their surrounding environments. For these reasons, it may initially seem that a set of legal and physical initiatives together with the installation of early flood warning systems can completely address the threat of floods. However, risks and vulnerabilities associated with floods are multidimensional and have important social aspects (Scheuer, et al, 2011; Adger, 2006; Lebel, et al, 2011).Therefore, structural and legal remedies are only fruitful in conjunction with training and education, advocacy, and in particular community-based activities. The concept of community resilience has been advanced in recent years to capture this observation.

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Focusing on the case of post-flood Neka in the Caspian coast, this article highlights the need for a community resilience approach to addressing disasters in Iran. The main question is, to what extent the major flood event in Neka in 1999 gave impetus to building a resilient community structure. Following this introduction, the community resilience approach and the Neka flood are described. Then findings from a qualitative field study conducted several years after the flood are discussed to address the above question.

Dealing with Floods through a Community Resilience Approach

It is now widely recognized that disaster mitigation requires community-based solutions that deal with the relationship between humans and their environments (for example, see Qurantelli, 1994). In this connection, a resilience approach to disaster mitigation has been developed in recent years, which is rooted in ecological concepts. Community resilience is enhanced by developing the ability to absorb the impact of disasters, to learn from disaster events, to adapt to new conditions, and to recover and reorganize after each disaster event. Communities exhibiting higher levels of resilience are able to mitigate the impact of disasters without affecting their internal elements. They learn to deal with each disaster event better than the previous one. The following has been cited in the literature as constituting community resilience in the face of disasters (López-Marrero and Tschakert, 2011; see also Folke, et al, 2003; Gardner and Denkens, 2007; Berkes, 2007).

- Learning to adapt to hazardous, changing, and uncertain environments through collective memory as well as accumulating and utilizing knowledge and experience related to risks and previous disasters as well as post-disaster recoveries;

- Benefiting from all types of collective knowledge through interaction among the largest group of stakeholders as well as collective thinking toward enhancing knowledge, skills, and capacities to mitigate risk and to plan and prepare for future events;

- Creating pluralistic and flexible structures to benefit from opportunities and to generate creative means to reduce risks, adapt to new conditions, and deal with disasters, including a diversity of strategies, operations, management options, and stakeholder institutions;

- Creating opportunity for the creation of vertical and horizontal networks of cooperation and coordination through which exchange of knowledge, experience, skills and in particular flexible decisions at the time of disasters become possible.

While community resilience entails participation of and cooperation among all relevant stakeholders, its development should be led or at least facilitated by the public sector.

Causes and Impacts of the Neka Flood

Heavy rains during July 24-25, 1999 caused the Neka River to overflow. The ensuing flood resulted in significant loss of life and considerable physical damage. In the area of Sari, Behshahr and Naka, 143 villages and significant infrastructure were damaged. In total, 5,023 housing and commercial units and 9,750 hectares of agricultural land were affected. A large number of livestock and light and heavy vehicles were lost. The impact of the flood in the city of Neka was also considerable. Total damages due to the flood were officially estimated as 480 billion rials at the time (Neka Disaster Taskforce, 1999).

Notwithstanding natural and geographic factors such as heavy rains and steep slopes, the effects of human activities on the environment including deforestation, sand and gravel mining and blocked waterways as well as flood zone encroachment and lack of an appropriate community response mechanism were the main culprits behind the significant impact of the Neka flood. Blocked waterways, deforestation and illegal sand and gravel mining, which had changed the ecological balance, point to insufficient regulations or insufficient legal enforcement. A large amount of cut or fallen tree branches existed in the area, which were washed downstream and blocked waterways. Furthermore, the main bridge in the city of Neka had been damaged two weeks before the flood. It had not been fixed and blocked the flow of water at the time of the flood. Construction along the Neka River had taken place prior to the flood despite regulations prohibiting it. In the city of Neka, the main library, an athletic center, and the office of a major charity foundation had been built in risk-prone areas along the river (Purahmad, 2002:67-69).

Views of Key Public-Sector Stakeholders in the Neka River Basin

Methodology

Findings presented in the following subsections are based on the results of field research conducted in 2005-6. Specifically, a set of group interviews focusing on the 1999 Neka flood were held with key public-sector stakeholders with a view to probe the extent to which the major flood event in Neka created the grounds for building a resilient community structure. Major themes in the group interviews included flood management, people's participation, existing cooperation and coordination networks, and knowledge about flood-related issues in the basin. Interviewees were also asked to fill out a questionnaire at the end of the sessions which probed the same themes as the discussions and helped to better record the deliberations. Interviewed stakeholders included managers of Regional Water Company, Agricultural Organization, Environmental Protection Organization, Natural Resources Organization, Transport Organization, and Metrology Organization as well as members of the governorate and local council.

Findings

Group interview participants highlighted the importance of the Neka basin as a flood-prone region that should be given due attention in the nation's flood management initiatives. They also stressed the fact that no system of flood warning existed in the basin. Indeed, the Neka basin had witnessed a number of floods in the previous two decades with devastating results. The frequency of floods in the basin was also on the rise due to a rapid rate of deforestation as well as increased (legal and illegal) sand and gravel mining. Most participants believed that flash floods were a main source of concern in the basin as compared to other events. According to them, another significant flood would most likely have as devastating of an outcome as the previous one.

According to the group interview participants, the Provincial Disaster Taskforce was the main responsible body during flood events. The Meteorology Organization (IRIMO) was said to be in charge of issuing precipitation warnings. The Regional Water Organization provided the needed hydrology information to the Disaster Taskforce. While the Regional Water Organization was in charge of flood mitigation, coordination with a number of other organizations was required to produce the desired outcome. Coordination should be achieved through the Provincial Disaster Taskforce, according to the participants.

As a result of the recent flood, it was stated, local officials had become much more familiar with their responsibilities. Yet, there was still a great void in terms of the required training and know-how. Participants gave education and training a central role in increasing the level of coordination and cooperation among the involved authorities.

The density of hydrometric and climatologic stations was reported to be higher in this basin relative to other basins. The Meteorology Organization (IRIMO) was in charge of training the needed personnel to manage the meteorological stations. It was also stated that a few studies were available (watershed identification and justification) for the basin.

The Regional Water Organization was reported to have a number of infrastructure projects at hand that would have positive impacts on flood management initiatives. These included flood and floodwater control, sediment control, and construction of reservoirs and diversion dams (there was no dam in the area to be used for flood control).

Public Awareness and Public Participation

Group interview participants indicated that flood-prone areas were not only known to the authorities but also to the local residents based on their experiences. Indeed, due to the high frequency of floods in the basin, people living along the river were believed to have absorbed much information about flood issues, including flood zone areas. Yet, local residents needed to participate in actual community activities in order to be effective actors. Their knowledge was said to be unsystematic and would be much more valuable in the context of community-based initiatives. Also some participants believed that in rural areas information about floods was scarce.

Participants added that there was no specific educational or public awareness program concerning flood issues aimed at local residents in the area. Yet, while no specific booklets, brochures or programs had been produced, some flood-related information was often provided in the activities of the Agricultural Jihad Organization and the Radio and Television Organization. The intention also existed to install warning signs in specific areas, and

to incorporate flood-related information in the educational programs of schools. Participants believed that information dissemination and education should involve several organizations, although the Disaster Taskforce should coordinate all activities.

Some of the participants believed that multiple organizations should be involved in raising community awareness and providing training on flood-related issues – including the Regional Water Organization, local councils, non-governmental organizations, Agricultural Jihad Organization, the Environmental Protection Organization, and the Natural Resources Organization. A number of participants also believed that flood management education should be provided by the Disaster Taskforce as well as the Red Crescent Society.

Participants stated that there had been little involvement of non-governmental or community-based organizations in flood-related activities. Yet, they also stated that the possibility definitely existed to involve such organizations, especially in environmental matters, considering that a significant number of non-governmental activities took place in the area. Participants further reported that there were watershed management cooperatives that could be utilized for flood management. In contrast to non-governmental and community-based organizations, local councils were said have been very much involved in floor-related issues. Specifically, the local councils were active during and after the 1999 flood (for example with the clean-up activities after the flood). Local council members stated that while local groups were certainly willing to participate in flood management initiatives, a concrete program would be required to realize their potentials.

Most participants believed that radio and television would be the best media for raising public awareness. One of the participants also suggested the provision of special rural classes for students and their parents on flood-related topics.

Controlling Flood Zone Encroachment

Group interview participants believed that while specific regulations concerning construction in the area existed, these regulations should be revised in light of their ineffectiveness and the revised regulations should be enforced much more rigorously.

According to the participants, due to the recent major flood in the basin, the political and social will was strong enough to free the flood zones along the rivers (in the urban areas in particular) of any encroachment (although pressure would remain to take over these areas again). It was believed that once people's awareness was raised (this time unfortunately due to a catastrophic event), it would be possible to gather enough support to reverse flood zone encroachment. People were exhibiting a full spirit of cooperation on this matter in the aftermath of the flood, according to the participants.

Furthermore, authorities had been able to allocate land for the purpose of resettling residents of flood zones. The program had been highly successful in its efforts, in the opinion of group interview participants. Ten hectares of land had been allocated for residential resettlement purposes with another 0.5 hectare for the resettlement of commercial activities. Around 95 percent of the residents in the flood zones had been resettled. While all publicly-owned facilities had been moved to new locations, at the time of the interviews, only 50-60 percent of the commercial units had been relocated. A 16-meter wide road was also being constructed along the river which could act as a barrier to flood zone encroachment. Moreover, a 20-meter wide strip next to the river was being cleared (in some areas a 30-meter strip and in a few areas a 120-meter strip).

Provisions were also being made to facilitate the construction of new housing in areas away from the flood zones. More importantly, new land had been made available. Participants in the group interviews believed that people in the flood zones would welcome the resettlement. Also one of the participants stated that authorities must be careful to prevent any wrongdoing and profiteering in the resettlement program. Another participant added that any person's resistance to resettle was due to lack of belief in the existence of risk as well as the fear of uncertain future resulting from lack of public financial support.

Monitoring construction along the river in urban areas was said to be within the authority of the municipalities. In rural areas however the Irrigation Organization was in charge. Whereas, in urban areas, encroachment had been mitigated to a large extent, in rural areas the task was more difficult, according to the participants. Specifically, the fine for encroachment was very small and certainly far below the price of land itself. According to the participants, to have an effective program in rural (as well as urban) areas, funds must become available for taking control of lands exhibiting high flood risk and turn them into green spaces.

Informal Flood Warning System and the Need for a Formal System

According to the participants, the recent flood also proved that the creation of a low-cost system of flood warning was quite possible. On the night of the flood, the Basij volunteers were able to knock on the door of every house in the flood zone to warn the residents of the coming flood. The activities of the Basij were however spontaneous and without any prior plans. Yet, they indicated the possibilities to form an inexpensive home-grown warning system.

Group interview participants also stated that while the spirit of cooperation existed among various organizations concerned with flood issues, a number of institutional and physical elements were missing. For example, one of the participants was of the belief that the organizations' will was only fifty percent of the game of cooperation; the other 50 percent would only materialize when the right equipment became available. According to this participant, in a 2000 hectare basin, the concentration time would only be 10 minutes. Warning would therefore need more sophisticated equipment than what was available. Group interview participants believed that meteorological stations were only of limited use as well because they were not reliable at all times. Another issue that was raised with this regard was equipment burglary and vandalism. Participants were of the belief that a hydrological system should be put in place as the nucleus of an efficient flood warning system. Overall, participants believed effective flood warning in the basin required both structural and non-structural measures.

Environmental Issues

The representative of the Environmental Protection Organization indicated that a number of areas had been declared environmentally protected. The implication of this protected status was that vegetation cover in such areas would be preserved and would have a very positive impact on flood prevention. Furthermore, efforts were being made by the Environmental Protection Organization to have a detailed environmental study with a flood prevention component prepared for the Golvard Dam (under construction in the basin).

Conclusions

The frequency and impact of floods in the Neka basin were exacerbated due to deforestation, sand and gravel mining, and flood zone encroachment. Yet, the experience of the devastating 1999 flood event created an opportunity to enhance community resilience to future flooding. The main outcomes of the enhanced political and community will was a resettlement program as well as efforts to prevent flood zone encroachment and sand and gravel mining. Yet, while the importance of alternative networks (Basij and local councils) became apparent in the 1999 flood, no initiative was undertaken to create a pluralistic and flexible structure to benefit from the existing opportunities and devise new ways of dealing with floods. Furthermore, while there were a number of non-governmental organizations active in the area and the authorities were cognizant of their importance in disaster-related community development, none was involved in disaster mitigation activities. Nor were such activities facilitated by the public sector. The provision of a comprehensive training and advocacy package was not targeted either although some basic flood-related information was offered by the Agricultural Jihad Organization and the Radio and Television Organization.

To enhance community resilience in the basin, collective memory, accumulation of experience and knowledge, and the means to reorganize after each event would be necessary in order to adapt to the risk-prone environment. Some basic levels of collective memory, accumulation of knowledge, and learning to reorganize were discernible in the community in Neka, based on the findings of this study. Yet, without planning and organized resilience-enhancing activities, benefiting from collective knowledge and thinking, ensuring community participation, collective, and improving skills and capacities to direct efforts toward improving preparedness and reducing risk in the basin would not be possible. It would be necessary to create vertical and horizontal networks of cooperation and coordination (through which exchange of knowledge, various types of experience, skills and resources as well as creation of a flexible decision-making structure would become feasible).

Overall, study findings indicate that due to the 1999 flood experience in Neka, both the authorities and community members recognized the need to form community structures and mechanism to reduce risk and prepare for future events. Yet, these were only prerequisites for enhancing community resilience, which would require coordinated activities initiated by the public sector with short-, medium-, and long-term resilience-enhancing goals and outcomes.

The Regional Water Company, the Environmental Protection Organization, and the Natural Resources Organization together with local councils, non-governmental organizations and community-based organizations could play key roles in such an endeavor.

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