International Journal of Disaster Risk Reduction 15 (2016) 73–79

Contents lists available at ScienceDirect

International Journal of Disaster Risk Reduction

journal homepage: www.elsevier.com/locate/ijdrr

Lack of scientific recordkeeping of disaster incidences: A big hurdle in disaster risk reduction in India

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ARTICLE INFO

Article history:
Received 10 August 2015
Received in revised form
18 December 2015
Accepted 19 December 2015
Available online 25 December 2015

Keywords:
Disaster risk reduction
Climate change
Adaptation
India

ABSTRACT

Despite enhanced awareness on various disaster management related issues and mounting disaster induced losses disaster risk reduction is far from getting its due share of attention and resources, particularly in India. This is attributed to (i) departmental inertia, (ii) lacking political foresight and will, (iii) fragmented decision-making authority, (iv) lacking techno-legal regime and non-compliance of what exists, (v) lack of capacity building, (vi) unawareness of the mass, (vii) lacking risk assessment and communication, (viii) missing locally relevant data and examples, and (ix) lack of objective and uniform disaster database. Based upon in depth analysis of the present situation recommended road map for DRR inclusive development includes (i) enhanced focus on mass awareness to ensure voluntary compliance and to do away with political apathy, (ii) comprehensive hazard, vulnerability and risk assessment and communication, (iii) enhanced investment on research and development related to disaster resilient technology and improvising traditional DRR practices, (iv) enhanced investment on capacity building, (v) invoking DRR compliant techno-legal regime and putting in place mechanism for its compliance, (vi) NDMA and SDMA to be provided authority to issue binding guidelines, (vii) institutional mechanism for collecting precise and objective data relating to disaster induced losses. Action on the suggested points is envisaged to streamline DRR interventions in India and help in bringing forth resilience amongst communities.

1. Introduction

A number of studies are regularly being undertaken on various facets of disaster incidences across the globe. The researchers are however yet not unanimous on the definition of disaster [1–6]. Some characteristics are however common to most proposed definitions that include the incidence as (i) being sudden, abrupt or unpredictable, (ii) causing human, material, economic or environmental losses and (iii) exceeding the ability of the affected community to cope with these. Non-unanimity of the definition affects objectivity of data collected by different agencies that in turn makes correlation of these data sets difficult. Despite this most practitioners agree that in the previous some decades world has witnessed rapid increase in both disaster incidences and economic losses caused by these. Fast increasing pace of economic losses due to disasters is often raised as a serious concern by them ([6], (Fig. 1)) and the same is often held responsible for low growth rate of underdeveloped and developing economies that are the worst sufferers of disaster incidences [7] and are not in a position to earmark comparable resources for disaster preparedness, mitigation, response and prevention.

Increasing frequency and intensity of disasters is often attributed to global warming and consequent changing climatic pattern [8–14] and analysis of available global disaster data pertaining to weather related disaster incidences that include drought, flood, storm, landslide, wildfire and extreme temperature gives credibility to these claims ([6],Fig. 2). In the period 1900–2015 these weather-induced disasters account for 53 percent of the human lives lost and 71 percent of the economic losses incurred globally due to disasters [6]. According to a recent UN report India and China are affected the most by weather related disasters [13].

Various studies and assessments suggest that in times to come frequency and intensity, as well as change in the location of natural hazards, can affect development gains and lead to large-scale displacement of human population apart from other losses [8–11,15,16,17]. There are recurring calls to be more efficient when managing the impacts of recurring natural hazards by integrating both disaster risk reduction (DRR) and climate change adaptation (CCA) with development activities [18–20].

Disaster management is put forth as a means of minimizing

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http://dx.doi.org/10.1016/j.ijdrr.2015.12.005
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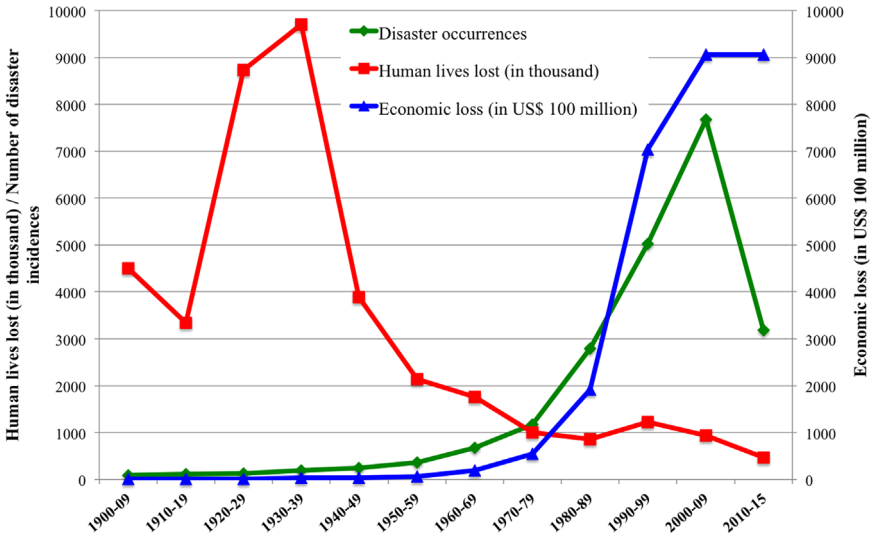

Fig. 1. Diagram depicting changing global trend of disasters. Data source: Em Dat of CRED; www.emdat.be.

disaster induced losses and human sufferings. It is defined as continuous and integrated process of planning, organising, coordinating and implementing measures which are necessary or expedient for (i) prevention of danger or threat of any disaster, (ii) mitigation or reduction of risk of any disaster or its severity or consequences, (iii) capacity building, (iv) preparedness to deal with any disaster, (v) prompt response to any threatening disaster situation or disaster, (vi) assessing the severity or magnitude of effects of any disaster, (vii) evacuation, rescue and relief, (viii) rehabilitation and reconstruction [5]. Rich dividends paid by practicing disaster management in some of the previous disaster incidences coupled with global advocacy in its favour through various conventions and frameworks have helped in popularizing precepts of disaster management amongst nations across the globe [21,22].

Evidences and assertions put forth on the possibility of increasing frequency and severity of disaster incidences in near future world community has lately started advocacy in favour of disaster risk reduction (DRR) and resilience. These are often put forth as universal prescriptions for reducing disaster-induced losses [23–27]. DRR is defined as the concept and practice of reducing disaster risk through systematic efforts to analyze and reduce the causal factors of disasters. Reducing exposure to hazards, lessening vulnerability of people, property and infrastructure, wise management of land and environment and improving preparedness and response capacities and early warning for adverse events are some of the components of DRR. Resilience is defined as the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions [28]. Capacity building and empowerment of community and community based organizations are important constituents for building resilience.

2. Disaster management related organizational set up in India

After Orissa super-cyclone of 1999 India started to focus on pre-disaster preparedness, planning, mitigation and prevention rather than post-disaster relief and rescue that was the practice since then. Till then flood and drought were considered major disaster incidences affecting the masses and the state intervention was restricted to post-disaster relief and rescue. The Ministry of

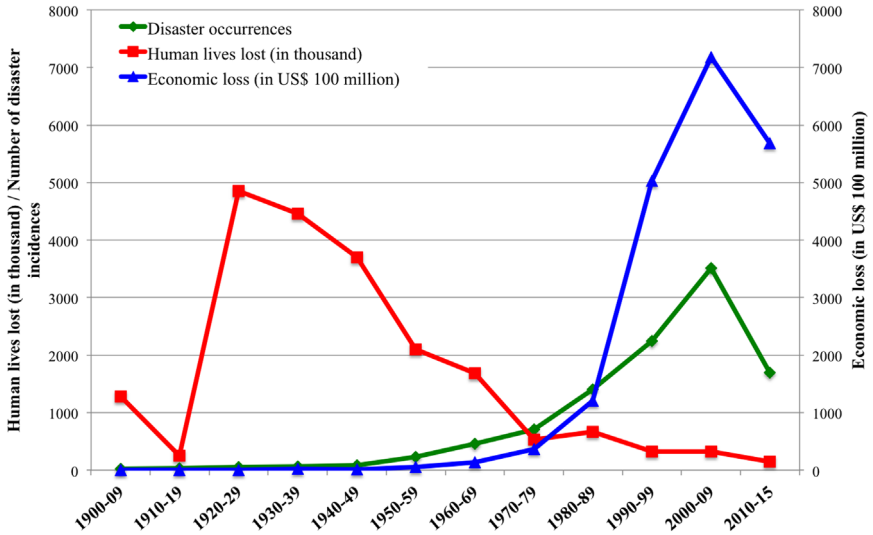

Fig. 2. Diagram depicting changing global trend of climate induced disasters. Data source: Em Dat of CRED; www.emdat.be.

Agriculture was then the nodal ministry for managing disaster related affairs. Experience of Orissa super-cyclone brought forth the need of effective coordination between organizations involved in post-disaster operations through planned and regular pre-disaster interaction between them. The responsibility of managing disasters was thus handed over to the Ministry of Home Affairs (MHA) for ensuring better inter-agency coordination at various stages of disaster management cycle [29].

Enacted in 2005 Disaster Management Act subsequently put forth institutional set up for disaster management in India. In accordance with Section 3 of the Act National Disaster Management Authority (NDMA) was set up as apex organization for disaster management in India with Prime Minister of Union of India its ex officio Chairperson [5]. Similarly in accordance with Sections 14 and 25 of the Act disaster management authorities were constituted at state and district level (State Disaster Management Authority; SDMA and District Disaster Management Authority; DDMA). Chief Minister of the state is the ex officio Chairperson of the SDMA while the District Magistrate of the district concerned is the Chairperson of the DDMA [5].

Accordingly as provided in Section 42 of the Act National Institute of Disaster Management (NIDM) was set up for disaster management related capacity building and in accordance with Section 44 of the Act National Disaster Response Force (NDRF) was constituted for ensuring prompt and effective specialist response to a threatening disaster situation or disaster [5]. Taking lead from the same some states of India have lately raised State Disaster Response Force (SDRF).

Despite setbacks and major devastation in a number of disasters particularly in Uttarakhand, Kashmir and Chennai floods of 2013, 2014 and 2015 respectively efforts made by centre and state governments in India have shown positive results and the same have been highly appreciated globally. This is attributed to technological advancement in precise forecasting of cyclone events that ensured timely and successful evacuation of around one million persons before cyclone Phailin struck Odisha in 2013 [30].

3. State of DRR initiatives in India

NDMA is the apex organization for disaster management related affairs in India. Section 6 of the Disaster Management Act [5], however holds it responsible only for laying down policies, plans and guidelines for disaster management and for ensuring timely and effective response to disaster [5]. The responsibility of managing disasters of different kind is also dispersed over several ministries and departments. Drought is managed by Ministry of Agriculture while management of other natural disasters is the responsibility of MHA. Responsibility of managing man-made disasters is entrusted to a number of ministries depending on the nature of mishap. Forest fire and chemical disasters as also climate change related issues are the responsibility of the Ministry of Environment, Forest and Climate Change while biological disasters are the responsibility of Ministry of Health and Family Welfare. Disasters related to mines are the responsibility of Ministry of Mines or Ministry of Coal or Ministry of Steel or other concerned ministry while nuclear disasters are the responsibility of MHA and Department of Atomic Energy. Similarly management of transport accidents is the responsibility of concerned ministry; Ministry of Surface Transport, Ministry of Shipping and Ministry of Civil Aviation.

Management of all disasters not being the responsibility of a single agency DRR related responsibilities are also spread over a number of agencies. Moreover DRR being a cross-sectoral activity the ministry or department responsible for a particular disaster is often not well equipped to handle all disaster safety related issues even of its infrastructure; the Ministry of Health and Family Welfare that is responsible for biological disasters lacks capabilities to undertake structural vulnerability audit of its infrastructure and ensure safety of the same in an earthquake event.

Apart from this NDMA and SDMA lack executive powers to enforce DRR related issues in the departmental plans and policies. These have no doubt been undertaking awareness and capacity building initiatives and issuing guidelines and advisories. Compliance of these is however not binding upon the states and other departments.

DRR is universally accepted as being a potent remedy for reducing disaster-induced losses and fostering the pace of growth and development in a sustained manner. The efforts put in by various agencies and organisations are however not yielding desired results. Apart from lack of dedicated resources with the department concerned other reasons of the same are as elaborated in the sections below.

3.1. Inertia

By nature humans resist change and the adoption of new ideas, processes and techniques is hard to come by unless backed by sustained efforts, authority, hard work, trial and error [5]. The departments concerned have been used to certain practices and introducing change in these involves revision of laid down norms, procedures and practices. Moreover there is possibility of the changes introduced not bearing desired results. The one introducing the change has therefore to be provided immunity from failure or adverse results.

Reasons of non-adoption of DRR by the departments include (i) implications of disaster incidences on departmental schemes, programs and assets are not adequately assessed, (ii) reasons for dovetailing DRR into departmental schemes and benefits emanating from these are not lucidly communicated and therefore not well appreciated, (iii) there is ambiguity about cost escalation and as to who would share the additional burden, (iv) adoption of DRR initiatives is suggested without consultation, awareness and capacity building, (v) change threatens to modify established patterns of working relationships between people, (vi) departments are not given enough time to adjust to the changed ground realities, (vii) benefits and rewards emanating from the change are not appropriately highlighted and often seem inadequate and (viii) efforts of NDMA and SDMA for awareness and capacity building of the departmental officials are not adequate and have failed to percolate down.

3.2. Political foresight and will

DRR is a long drawn exercise that requires resource investment on a continuous basis. This at the same time does not result in tangible outputs. These initiatives are therefore largely perceived as having little potential of bringing forth political gain. DRR thus fails to get the required attention of the political leadership that often restricts its involvement to immediate relief rather than long-term DRR initiatives. This results in overemphasis upon short-term initiatives, which is detrimental to the cause of DRR. This at the same time fails to incentivize masses to be associated with DRR initiatives.

Moreover implementation of DRR related initiatives often involves decisions that are likely to invite popular resistance. This is experienced in the implementation of building bye laws and landuse restrictions as also in ensuring compliance of other disaster safety measures. The fear of mass opposition turning into electoral debacle thus draws the politicians away from DRR initiatives.

3.3. Fragmented decision-making authority

The Disaster Management Act [5] entrusts NDMA and SDMA with the responsibility of suggesting various DRR related interventions in departmental plans and schemes. These have however not been granted authority of any kind to ensure compliance of the same. In such a situation it is up to the department concerned to include or not to include DRR related provisions in the departmental plans and schemes. Lack of awareness on short and long term benefits of incorporating DRR measures and motivation to do so results in non-compliance of DRR measures.

3.4. Techno-legal regime

It is necessary to have rules and regulations for reducing disaster-induced losses and ensuring incorporation of appropriate DRR measures in all development initiatives. Besides strict compliance, there has to be a mechanism of reviewing compliance and effectiveness of these and updating these from time to time. In India Bureau of Indian Standards (BIS) is responsible for issuing codes and standards and it has been routinely issuing and updating codes for ensuring disaster safety in various infrastructure works. BIS Codes are however not mandatory and it is up to the local regulatory authorities to adopt and incorporate these in their bye laws. The bye laws in India thus lack uniformity and vary from place to place.

Limited manpower available with the local authorities further makes it difficult to ensure compliance of the laid down standards. The practice of compounding, whereby non-compliant structures are regularized by charging monetary fine, that is prevalent in many local authorities further leaves people with little deterrence to violate the bye laws.

Large proportion of the developmental works at the same time take place outside the limits of the local regulatory authorities. No agency is responsible for ensuring compliance of bye laws and regulating developmental works in these areas.

Landuse regulations are at the same time non-existent in most of the states and there is no deterrence for undertaking developmental works so long as one has legal title of the land concerned. This has resulted in human encroachment in areas that are vulnerable to various hazards.

3.5. Capacity building

Most constructions taking place in India are non-engineered and undertaken by masons who also design the layout and decide about reinforcement based upon their experience. There exists no provision of formal training of masons and bar-benders in India and they acquire knowledge on various aspects related to construction through experience. This is observed to result in serious lapses in most constructions, which is continuously enhancing the vulnerability of the built environment.

3.6. Awareness

Rules and regulations alone are not enough for ensuring incorporation of DRR measures in all developmental initiatives. Despite best efforts the enforcement agencies fail to bring forth compliance for the lack of voluntary compliance of the measures by private individuals. For this masses have to be made aware of locally relevant hazards and risks together with implications of neglecting DRR measures.

At present most awareness material being circulated by NDMA and SDMA pertains only to general dos and don'ts during various disasters and have no mention of local hazards. Together with this the efforts for making masses aware of the benefits of adopting various DRR measures are lacking. The awareness campaign is also observed to be sporadic and lacks the desired aggressiveness.

3.7. Risk assessment and communication

Communication of risk of real hazards faced by the masses has been highly effective in ensuring voluntary compliance of DRR measures. This makes hazard, risk and vulnerability studies highly pertinent. At present these studies are being undertaken in a scattered manner and are not easily available to the masses [31].

Besides making the masses aware of the risk of hazards faced by them this exercise would reduce the chances of mass resistance if legislative measures are invoked for ensuring DRR. This would at the same time help in bringing forth political consensus on the need of implementing DRR measures.

3.8. Locally relevant data and examples

Masses have an extremely short memory of the disaster incidences and with the passage of time they start to indulge in activities that resulted in losses in the previous incidences. The local communities do not have mechanism of keeping record of previous disasters. Folklores most of the times are utilized for keeping pleasant memories afresh but the same is not the case with disasters. None in the field was thus observed to be aware if Kumaun and Garhwal earthquakes of 1720 and 1803 [32] respectively affected the region.

3.9. Missing disaster database

At present there exists no mechanism of comprehensively recording disaster-induced data. Even the state does neither record all disaster related incidences nor maintains objective, and comprehensive database pertaining to these. This deters scientific research on disaster trends and is perceived to be an important factor responsible for non-compliance of DRR measures.

4. Present state of disaster database

Need of systematic data for disaster mitigation and prevention is emerging as a major concern for both development and response agencies. In the past, data needs were addressed on an ad hoc basis that included collecting the information at the time of the emergency. However, there is a growing understanding that data collection, analysis, and management can help in addressing both short and long-term development goals and in identifying and addressing disaster risks.

In India there however exists no formal mechanism for scientific and objective data collection related to disasters. It is logical to hold the concerned Department of Disaster Management or Disaster Management Authority responsible for this lapse. However lack of an objective definition of disaster is identified as a major reason thereof.

Disaster Management Act [5] defines disaster as being a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man made causes, or by accident or negligence which results in substantial loss of life or human sufferings or damage to, and destruction of, property, or damage to, or degradation of, environment, and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area [5].

This definition is too extensive and covers almost all incidences that have adverse affect on human interests. These incidences are too diverse and responsibility of managing these is dispersed over many departments and agencies. Moreover rather than providing

a lower limit of loss that would qualify an incidence as being a disaster it puts forth "substantial loss" as the qualifying criteria. This makes the definition highly subjective. Together with this being "beyond the coping capacity of the affected community" is put forth as another criterion for identifying any incidence as being a disaster. It however does not provide any objective basis for assessing the coping capacity of the community.

The definition of disaster provided by the Act is therefore assessed as being highly subjective and based on this it is hard to objectively identify incidences as being or not being disaster. In such a situation it is hard to expect any organization or agency to keep track of all incidences that qualify as being disaster according to the definition so put forth. This results in lack of objectivity, uniformity and continuity in the database of disasters.

Moreover in India there is a provision of extending relief to the disaster victims [33,34]. For this all the states of Union of India are provided annual grants under State Disaster Response Fund (SDRF) in accordance with the recommendations of the Finance Commission. For the period 2015–16 to 2020–21 in accordance with the recommendations of 14th Finance Commission an amount of Rs. 61,219 crore is earmarked under this head [33]. In addition to this the disaster-affected states are entitled to seek resources out of National Disaster Response Fund (NDRF) in case of grave natural calamity.

SDRF can be utilised for extending relief to disaster victims for their personal losses as also for the restoration of certain public infrastructure in accordance with SDRF guidelines that provide for immediate relief at a standardized rate that has no relationship with either magnitude of the incidence or actual losses incurred by individuals. In such a scenario there is little incentive for assessing actual losses and relief amount disbursed is often recorded as the disaster induced loss.

Moreover relief out of SDRF is admissible only to the victims of certain hazards that are formally notified as being disasters. At present these include (i) cyclone, (ii) drought, (iii) earthquake, (iv) fire, (v) flash flood, (vi) cloud burst, (vii) avalanche, (viii) landslide, (ix) pest attack, (x) hail storm, (xi) tsunami and (xii) cold wave/frost. So the database often available formally for disaster incidences and losses incurred by these pertains to incidences of these 12 natural hazards [33,34]. These incidences are often recorded only if the nature loss is of such a nature that is covered by SDRF guidelines [34]. As the SDRF guidelines do not provide for relief in case of loss of commercial assets the data on the loss of commercial assets is invariably missing.

The SDRF guidelines further make relief admissible for only a portion of the losses incurred. A disaster-affected individual is thereby entitled for relief for the loss of one residential house. In case more than one residential houses of an individual are lost only one house can well be registered as being lost in the disaster. Likewise, for the loss of farm animals relief to an individual is provided only for the loss of 03 large or 30 small milch animals or 03 large or 06 small draught animals and therefore this can be the upper limit of the farm animals recorded as lost even in cases where actual loss of an individual is much higher [34].

On the aftermath of a disaster assessment of disaster-induced losses is carried out by the state with an objective of extending relief to disaster-affected population and for providing resources to the departments concerned whose disaster-affected infrastructures qualifies for support out of SDRF. As the relief is disbursed on the basis of SDRF guidelines only the losses covered by these are often recorded. Moreover relief is paid at a pre-defined standardized rate and therefore efforts are not made to assess actual economic losses. So the personal disaster induced losses are largely recorded in terms of numbers rather than in monetary terms. Moreover the vulnerability functions related to the lost infrastructure are not recorded. So based on the available data there exists no way of assessing if the losses were incurred to vulnerable infrastructure alone.

On the aftermath of a major disaster the affected state government seeks assistance from the central government out of NDRF for the repair and restoration of the public infrastructure damaged by disaster. Here too the losses incurred to the infrastructure covered by SDRF norms alone are recorded. Assets of Primary Education sector are covered by SDRF but those of Secondary or Higher Education are not and therefore it is likely that the details of the losses incurred to the infrastructure of these by disasters are not recorded. Moreover the central government provides only a fraction of the assistance sought by the state governments and therefore the loss of public infrastructure as reported by the state governments is often inflated.

So the available data of disaster-induced losses is plagued by a number of shortcomings and is of little use for DRR related planning; (i) the data pertains to only 12 notified natural hazards, (ii) the losses recorded pertain to only those covered by SDRF guidelines and do not provide a holistic picture, (iii) the data pertaining to loss of commercial assets is missing, (iv) the data pertaining to loss of personal property is restricted to numbers alone, (v) the data pertaining to loss of personal property is restricted to that covered by SDRF guidelines, (vi) monetary worth of loss of personal property is missing, (vii) the loss of private property as reported lost in disaster is under-reported, (viii) data pertaining to loss of public infrastructure pertains to only those covered by SDRF guidelines, (ix) the reported loss of public infrastructure is often inflated, and (x) there exist no details of vulnerability of the infrastructure affected by disaster.

5. Discussion and way forward

It is universally accepted that investment on DRR is a must for retarding the pace of disaster-induced losses and ensuing human miseries as also for fostering the pace of growth and development. This becomes all the more important at the face of assertions that changing climate would make extreme climatic events all the more frequent and intense. Despite this it needs to be accepted that DRR related issues are not being adequately addressed in India and certain bottlenecks are restricting dovetailing of DRR concerns in development, which is detrimental to long-term national interests. It therefore becomes imperative to look for grey areas and accordingly plan for overcoming these bottlenecks.

Importance of legislative measures, organizational set up and planning cannot be overemphasized but first of all it needs to be realized that DRR goals cannot really be achieved without voluntary compliance of the related measures by the masses. Mass awareness therefore holds the key to the success of DRR. A well designed, highly visible, easy to understand and aggressive media campaign with which masses can associate themselves has therefore to be launched in a sustained manner.

The awareness campaign should highlight short and long-term gains emanating from the DRR interventions together with the adverse impact of maintaining status quo. The awareness material should be locally relevant and incorporate local risk scenarios together with losses suffered in previous disaster incidences. It should at the same time provide practical, technologically sound and cost effective risk reduction measures in an easy to understand language, preferably in local dialect. This would motivate masses to comply with regulations and practice risk reduction.

Secondly it is highly important to undertake comprehensive hazard, vulnerability and risk assessment studies on a scale that can be utilized for planning purposes. The results of these studies should be made available to the masses in a decipherable manner together with corrective risk reduction measures. This would bring

forth voluntary compliance of the risk reduction measures by the masses.

Due to the absence of these studies infrastructure insurance policies are at present offered at a standardized premium that does not take note of differential hazard proneness of the place or hazard resistant features incorporated in the structure. This makes insurance costly and is responsible for its low penetration. Hazard, vulnerability and risk scenarios would make insurance cheap particularly in the areas facing low risk of hazards and for DRR compliant structures. Besides enhancing penetration of risk reduction measures this would bring forth awareness amongst the masses regarding areas with high hazard and the same would be a disincentive for people to invest in such areas.

Awareness of the masses relating to disaster risk faced by them would emanate demand for DRR measures that would make it difficult for the political leadership to overlook investment on DRR. Political interest in DRR related initiatives would in turn ensure enactment of appropriate legislative measures for ensuring safety and weaken popular resistance to their enforcement.

Thirdly it is required that investment of research relating to the development of disaster resilient technology as also improvising traditional DRR practices be enhanced. This would result in locally relevant, cost effective, and easy to replicate DRR options that could be promoted and popularized through awareness campaigns.

Fourthly it is essential to invest in the capacity building of the officials so that they can better appreciate the importance of DRR initiatives and create an enabling environment for dovetailing of DRR measures in departmental programs and schemes.

Fifthly DRR compliant techno-legal regime should be invoked with appropriately strict deterrent and punitive measures for non-compliance. Widely prevalent practice of compounding needs to be done away with immediately and the structures constructed defying laid down norms and standards should necessarily be demolished.

Incorporation of appropriate DRR measures in all commercial assets and places of mass gathering should be linked to the permission to operate these. At the same time there has to be provision of soft loans and tax exemptions for those intending to incorporate DRR measures.

Appropriate legislative measures should at the same time invoked for enactment of landuse restrictions and anthropogenic intervention should necessarily be restricted in identified hazard prone zones.

In the hills all infrastructure development initiatives require excavation of hill slopes that results in debris. In the absence appropriate regulatory framework the same is disposed off along the hill slopes. This results in riverbed aggradation and fast siltation of reservoirs and lakes besides initiating mass instability, deforestation and siltation of agricultural fields, waterways and springs. Techno-legal regime therefore needs to be put in place for ensuring scientific disposal of excavated material at pre-identified and notified locations.

Depletion of water table and urban floods are fast emerging as major threats and appropriate legislative measures are required to be invoked for addressing these and other emerging hazard related issues.

Sixthly, it is urgently required that NDMA and SDMA be provided authority to issue binding guidelines for the compliance of DRR measures in departmental plans and schemes.

Lastly it is a must to appreciate the importance of precise and objective data relating to disaster induced losses. This data is increasingly being utilized for studying changing patterns of vulnerability and risk that the communities face and for formulating appropriate policies and introducing DRR inputs for better management of disasters. This data is at the same time being utilized as a powerful tool for justifying investment on DRR initiatives and convincing the ones responsible for approving schemes and allocating budgetary outlays. These people are generally used to weighing issues in terms of cost of doing certain things against that of not doing these and then justifying investment on certain sectors and withholding that on others.

It must be realized that the presently available disaster loss related data is nothing more than an account of relief extended to disaster victims and amount spent in restoration and repair of public infrastructure in case of 12 notified natural hazards for which expenses out of SDRF have been allowed [33,34]. Even in case of these 12 notified hazards there is no record of actual economic losses and details of loss of commercial assets in virtually non-existent. As regards other hazards there exists no comprehensive and continuous database. The available data is thus of little use for DRR related planning.

In such a situation one option could be to put forth an objective definition like the one utilized by Centre for Research on the Epidemiology of Disasters (CRED) that maintains global database of disasters and includes incidences in its database only if (i) 10 or more people are reported to be killed, or (ii) 100 or more people are reported to be affected, or (iii) there is declaration of a state of emergency, or (iv) there is call for international assistance [6]. Regardless of whether or not there is “substantial loss” or whether or not the magnitude of the incidence is “beyond the coping capacity of the community concerned” an incidence is recorded as disaster if any of the foregoing 04 conditions are fulfilled. Though intended to bring forth objectivity in disaster database any attempt on these lines is sure to invoke popular opposition as in overwhelmingly large number of incidences the affected persons might not qualify as being disaster affected.

Other viable option could be to set up institutional framework for disaster loss related data collection. All incidences, natural or manmade, causing loss of human interests would objectively qualify as being disaster incidences as per the definition put forth by Disaster Management Act [5] if substantial loss and being beyond the coping capacity of the community are done away with as being qualifying criteria. In such a situation the responsibility of collecting disaster loss related data and recording vulnerability status of the assets affected by hazards can be entrusted to respective District Disaster Management Authorities. This data can subsequently be compiled at state level by concerned SDMAs and at nation level by NDMA. Registering the mandated details could be made a precondition for spending funds made available to the states and this would be an added incentive to keep this database updated.

This uniform disaster loss related database could subsequently be utilized by various agencies that at present independently invest resources for data collection. Besides ensuring availability of uniform and standardized disaster loss related data this exercise could thus prove to be economically rewarding.

Adoption of the measures suggested here would (i) bring DRR to the centre stage of development, (ii) ensure required funding for DRR initiatives, (iii) ensure innovations in DRR related technologies, (iv) popularize risk transfer mechanisms, (v) bring forth mass awareness on DRR related issues and (vi) ensure voluntary compliance of DRR regime. This would thus pave way for building disaster resilient communities and nation.

Acknowledgements

Author is thankful to the colleagues at Disaster Mitigation and Management Centre (DMMC) for intellectual inputs, support and encouragement. All the officials of the Department of Disaster Management, Government of Uttarakhand are thanked for

support, cooperation and encouragement.

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