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3D time history analysis of RC structures versus commercial methods with attention to the modeling of floor slabs and near versus far-fault earthquakes

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Keywords

flexural stiffness
floor slab
near-fault earthquake
wall-frame structures

Abstract

Commercial software such as ETABS and SAP, commonly used for the analysis of apartment buildings, assume the slabs as a rigid or semi-rigid membrane and only roughly allow for the slab's flexural stiffness using the concept of effective width. These assumptions when further simplified adopting a 2D frame method that ignores the torsional effects may produce results that are very different to the full 3D finite element modeling in particular when time-history nonlinear dynamic behavior is sought. The errors could be larger in near-fault earthquakes that often excite higher vibration modes. Recent major earthquakes (Northridge 1994, Kobe 1995, Chi-chi 1999 and Bam 2003, etc.) have shown that many near-fault ground motions possess prominent acceleration pulses that result in different structural responses for common medium to high-rise buildings. Incorrect incorporation of the flexural stiffness of slabs can in some cases underestimate the lateral stiffness. It is shown in the current paper that in a wall-frame structure subjected to near-fault earthquakes, the full 3D time history modeling can significantly vary the analysis results and as such is an important consideration in design.

Disaster management knowledge base induction within the education sector of Kerala, India

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Keywords

disaster education
curriculum development
knowledge management

Abstract

India's diverse risks to various natural hazards on account of its unique geo-climatic conditions are quite well known and studied by many researchers from India and abroad. The vulnerability of people to natural disasters depends on their socio-economic status which determines the non-structural components of vulnerability indicators. The socio economic system of a nation has imperative effects in determining the educational stability, coverage and schooling across the country and it alters in states as per the political willingness and institutional strengthens. An education system embedded with disaster management concepts and practices is crucial to reduce the vulnerability of communities and to equip future generations with disaster resiliency. Disaster management educational institutes and authorities can make relevant changes in improving the individuals and community capacity to prepare for, respond to and recover from disasters. Progress in disaster knowledge dissemination in Kerala education sector has been evaluated for the present study with an aim of segregating the disaster management components from different educational hierarchy. Efforts have been put forth to identify the existing gaps in the disaster management education and awareness structure among the students undergoing various curricula and syllabi. The study tried to identify the absence or presence and extent of disaster management components in normal education system in schools as an exclusive subject or as an ingredient in traditional subjects of learning. University level dissemination of disaster management knowledge base through graduate and post graduate courses of both arts and science streams in the universities of Kerala has also been considered to quantitatively assess the student community who acquires methodical disaster knowledge annually.

Dam disasters: Risk assessment, avoidance and control during the planning, construction and stewardship phases for the dam projects in Kerala

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KEYWORDS

dam disaster
Mullaperiyar
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ABSTRACT

The issue of instability of the Mullaperiyar dam and associated controversies have aroused public and scholarly concerns over the stability of the other existing dams and many in the planning phases in Kerala. Dams were regarded as 'temples of modern India'. Proliferation of the dams dwindled development to a diminishing return level and then these temples were called 'tombs' of modern India. Now the instability factors of the dams too are the debates called 'dam dooms'. Older dams world over too have the inherent flows like the absence of any projections of their impact, structural strength or risk. But in developed countries later investigations and regulations brought them under strict surveillance and control. The processes of risk assessment, avoidance, control or mitigation for dams become an uphill task due to the conflicts in interests and stake holdings all along the life cycle of a project. Factors for the risks can be natural, physical or political. Political group include territorial, corporate, ethnic, cultural, socio-linguistic and fiscal politics. Issues like projects located outside the territory or jurisdiction of the owners, Owners or stakeholders living away from the risk zone but enjoying the fruits of the dam like regulated water or hydropower, conflict in interest between upstream and downstream entities, geopolitical stake holdings of cultures and groups etc impede on the safety surveillance and stewardship of the dams. A causal perusal into the geomorphic and geological framework of the project site will reveal that most of the current projects are located in a row in shear, fracture or lineament zones which defines the river valley systems. Most of the dams are located in the vicinity of the fault zone across the river system expressed as distinct water fall or cascade in the case of hydroelectric projects. These are all structurally and or seismologically vulnerable areas. Most of the river systems carry multiple run of river projects for hydroelectric power generation. All these indicate risks and hazards. 'Disasters occur when hazards meet vulnerability'. Land cover and land use in the upstream side of the dam is constantly changing by process of deforestation, large scale farming and terrain modification with indiscriminate soil erosion. Meteorological deviations due to processes from global warming to deforestation were beyond forecast while the existing dams were designed and executed. Among the globally documented modes of failure like Structural failure, Differential settlement, High uplift pressures, Settlement and cracking of concrete or embankment dams, Piping and seepage, Seepage and erosion along hydraulic structures such as outlet, Cracks in dam etc can be avoided by proper geological and environmental investigations. A comprehensive sociological and demographical mapping will help in assessing the risk and vulnerable situations. From the experience gained by the Impact assessment in several dams in Kerala the authors propose a protocol for the identification of the risks and vulnerability for the globally accepted factors and the stewardship practices to be followed in different life cycles of the dam projects.

Analysing the earthquake vulnerabilities for urban areas: In the context of Chittagong city

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KEYWORDS

unplanned urbanization
urban risk
urban vulnerability reduction
physical urban vulnerability
unplanned urban settlement

ABSTRACT

The historical seismicity along with recent seismic activities of Bangladesh indicates that our country is at high seismic risk. Earthquake has a great impact on urban areas rather than rural areas. The existing urban trend and urbanization process of Bangladesh, increases vulnerability to natural disasters like earthquake through the unplanned & high concentration of people and assets. The increasing urban risk results in vicious circle of disasters affecting urbanization and urbanization affecting disasters. The risk in urban centre is compounded due to unplanned urbanization, development in high risk zones. This paper interprets the urban vulnerability for earthquakes based on existing physical environment. Chittagong city, one of the major urban areas, experiencing physical vulnerabilities like, informal or unplanned settlements, poor infrastructures, existence of vulnerable built environments and so on. Rapid urban growth is causing deterioration and increasing the vulnerability of human lives, economy and infrastructures. If a strong earthquake attacking Chittagong city which may result damages and destruction of massive proportions and may create disastrous consequences for the entire country. This paper aims to analyze the issues related to physical urban vulnerability in detail to arrive at strategies or policy based solutions that are necessary to support the redevelopment of urban areas like Chittagong. By combining this vulnerability assessment of Chittagong city, this paper tries to give some strategic guidelines for the utmost use during disaster.

Disaster, risk and vulnerability due to earthquakes and designing of seismic resistant structure for mitigation

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KEYWORDS

hazard
urbanization
prevention
tectonic
vulnerability
awareness

ABSTRACT

The natural disasters due to earthquakes are not rare or unusual phenomenon in India. This paper examines the cause of earthquake, which accounts for more loss of life and property than any other natural phenomena. It analyses the hazard vulnerability in respect of earthquakes and discusses the usefulness of the Vulnerability Atlas, which is being developed by different organizations in India, for formulating proactive policies to face the threat due to natural hazards. It discusses the different aspects of natural disasters and gives a brief account of the statistics on disasters. Almost 85% of the country is vulnerable to disasters and 54% of the area lies in a high seismic zones and the number of people affected about 90%. This paper discusses the advances in designing seismic resistant structures and performance studies of progressive collapse of structures damage assessment to combat earthquakes and hazard vulnerability in India. It focuses on the fact that increasing urbanization and degradation of the natural environment on a global scale are having the effect in increasing the frequency and severity of disasters around the world. It discusses the statistics of disasters, prevention potential of disaster by societies and appropriate disaster prevention standards. It suggests for the designing seismic resistant buildings and structures for disaster mitigation and management, and it should be a part of sanctioning building plan to meet the challenges of sustainable development.

Hydrogeochemical evaluation of groundwater in Mamam river basin, South Kerala, India, using geospatial technology

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KEYWORDS

groundwater
Mamam river basin
laterite
over exploited block
quality zone map

ABSTRACT

Groundwater is an imperative source of water for domestic, agricultural and industrial purposes. It is a powerful solvent and dissolves minerals in rocks with which it draw closer contact. Agricultural and industrial developmental activities cause deterioration of groundwater quality. Ample provision of good quality water is essential for sustenance of life, hence regular monitoring of water quality is essential. In this work an attempt was made to assess the groundwater quality of Mamam River basin, located in the southern part of Thiruvananthapuram district of Kerala state. The study area lies in the Survey of India toposheet numbers D/14NE, D/14NW, D/14SE and D/14SW in 1:25,000 scale. One of the over exploited blocks of Kerala, the Chirayinkeezh block is positioned in the lower reaches of the river basin and hence the area was chosen for the study. The major rock types encountered are garnet biotite gneiss, khondalite and charnockite overlain by laterite. Water samples were collected from 76 open wells in both pre (May 2010) and post (August 2009) monsoon seasons. Physico chemical parameters like pH, EC, TDS, salinity, total hardness and other major ions were analyzed, by following standard methods. Acquired data was compared with the guideline values of BIS to review the water quality status in this region. The mean pH of post monsoon water sample is 5.33 and the range is between 4.1 and 6.9, while the mean pH of pre monsoon sample is 5.23 and it ranges from 4 to 6.9. It designates that in most of the places pH is far below than the permissible level. This observation identify that the water available in shallow aquifer is more of acidic character. In post monsoon season highly acidic pH values range between 4 and 5, was recorded from 19 locations, whereas in pre monsoon season it is enhanced to 28 locations. The mean value of EC and TDS in post monsoon season is 177.84 and 107.21 respectively and the analogous pre monsoon values are 197.31 and 122.9 correspondingly. Anomalous EC (2777 μs), TDS (1565 ppm) and salinity (1.75 ppt) values were obtained in a well near the coast at Thazhampalli during pre monsoon. This can be attributed due to the influx of salt water, created as a result of reduced recharging rate and over extraction of aquifer during summer period. Other worthy observation is Ca values of five pre monsoon samples exceed the highest desirable limits of BIS, while total hardness Mg, Na, K, Chloride, NO_3^-, SO_4^-, PO_4^{3-} and HCO_3^- for both seasons falls within the highest desirable limits. Acidic pH is found to be the main problem in the study area. It may be due to the percolation of water through laterite aquifer system, presence of coir retting yards and utilization of excess fertilizers in rubber plantation. Low pH can cause gastro intestinal disorders like hyper acidity, ulcers, stomach pain and burning sensation among the users and in addition to this pH value below 6.5 can cause corrosion in water carrying metallic pipes. GIS tool was used to prepare the groundwater quality zone maps, by assigning suitable rank and weightages to pertinent water quality parameters, which do have explicit control on the quality of water in the region. Arc GIS 9.3 software was used and it was done by overlapping of thematic maps representing distribution of pH, EC, TDS and Ca. In those areas where acidic pH was encountered needs momentous contemplation for recuperating the water quality by adopting fitting process to guarantee ample supply of fresh drinking water.

Benthic foraminifera from trenches in Kannur district, Kerala: Are they a pointer to the occurrence of a paleotsunami?

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KEYWORDS

foraminiferal species
paleo-tsunami
chevron deposits
shoreline
Kerala coast

ABSTRACT

Benthic foraminiferal assemblages provide considerable information about the environmental conditions they lived in, and are widely used in paleoenvironmental studies. In recent years, especially after the Indian Ocean tsunami on December 26, 2004, foraminifers and ostracods have been used to decipher the dynamics of tsunami deposits, their provenance and the water depth offshore from where they could have been scoured and deposited on land. This has helped in the characterization of tsunami deposits, which would be of immense utility in paleotsunami studies, provided a bathymetric and shelf foraminiferal database already exists. In search of ideal sites for paleotsunami deposits, several locations were selected in Kannur District, Kerala, based on the presence of peculiar, dark-colored sandy muds with several mollusks and gastropods. Trenches were dug at 13 sites, up to a maximum depth of 3.6 m. The sub-samples at 2.55 m below have yielded innumerable tests, both very well preserved as well as poorly preserved ones. So far, 14 benthic foraminiferal species have been identified; a lone specimen of *Globigerinoides* sp. (a planktonic foraminifer) was obtained but has not been considered for environmental interpretation as it most probably is a displaced specimen. The foraminiferal assemblage consists of *Ammonia beccarii*, *A. convexa*, *A. dentata*, *A. tepida*, *Asterorotalia inflata*, *Cribrononion simplex*, *C.* sp., *Elphidium discoidale*, *Helenina anderseni*, *Nonionoides boueanum*, *N. elongatum*, *Nonionella stella*, *Rotorboides granulosus* and *Pararotalia calcar*, of which *A. beccarii* is very abundant, followed by *N. elongatum* and *Helenina anderseni*. Available ^{14}C dates for the sub-samples at depths of 2.0 m, 2.8 m and 3.3 m are 4,685 ± 100, 4,845 ± 100, and 5,200 ± 110 years, respectively. These trench sites are about 5 to 8 km inland from the present-day shoreline and, based on the benthic foraminiferal assemblage obtained, there are indications that this region might have been an estuary, as modern estuarine benthic foraminiferal assemblages are strikingly similar. On the other hand, as the dates coincide with the Burckle Crater Impact in the Indian Ocean, the possibility of the occurrence of a paleotsunami ∼4,800 B.P. is also being explored. It is to be noted that deep-sea foraminifers and sediment have been identified from chevron deposits on the island of Madagascar, and their presence has been attributed to this mega-tsunami event, with the impact located at 30° 52′ 12″ S latitude and 61° 21′ 36″ E. Considering the distance between the Kerala coast and Madagascar, and also the fact that the extrapolated tsunami wave height could have been 250 to 300 m in the vicinity of Madagascar, the probability of a tsunami of 15 to 20 m height hitting the Kerala coast must have been very high. The results of this study are expected to confirm the provenance of the deposit and its relation to the extra-terrestrial impact-related tsunami event.

Remote sensing- and GIS-based seismic sub-zonation in north-western Tamilnadu

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KEYWORDS

GIS
seismic zoning
Tamil Nadu

ABSTRACT

There are 4 major seismic zones (zones II, III, IV and V) in India, based on the seismotectonic parameters, history of seismicity and certain geophysical parameters. Accordingly, most parts of northern and western Tamilnadu are categorized under zone III, while the other parts fall under zone II. Since such a broad classification system will lead to regional level instead of local information for efficient disaster management, there is a necessity to have sub-classes. This paper attempts to study the northern and western districts of Tamilnadu (Chennai, Thiruvallur, Kanchipuram, Cuddalore, Villupuram, Vellore, Dharmapuri, Salem, Erode, Tiruvannamalai and Coimbatore) and arrive at a map that indicates sub-classes of seismic zones in these districts. The factors considered for this study include: fractures/lineaments, history of earthquakes, and magnitude of earthquakes, Peak Ground Acceleration (PGA) and lithology. The input from remote sensing includes the use of satellite images to map the fractures, lineaments and lithology for the districts considered. The GIS based study involved both buffering and layer analysis. Buffering was used to demarcate the proximity of settlements to lineaments, while layer analysis involved assigning appropriate weights and ranks to the themes and preparation of the final zonation map. The result is a map indicating sub-classes/areas with high, moderate and low probabilities of seismicity within zones II and III of the north-western districts of Tamilnadu. Thus, it is seen that towns such as Arakkonam, Tirupattur, Katpadi and Ambur (belonging to the district of Vellore), which were hitherto categorized under Zone III, can now be categorized as: Arakkonam-*Zone III low*, Tirupattur-*Zone III low-medium*, Katpadi-*Zone III medium-high* and Ambur-*Zone III high*. Similarly, the other towns and villages can now be categorized into sub-classes. Thus, it is seen that such a remote sensing and GIS based analysis can help in prioritizing preventive measures to be taken for earthquake hazard mitigation and management in these districts.

Seismic risk analysis of lightweight concrete structures for dwelling

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Keywords

lightweight concrete
normal concrete
seismic risk
earthquake vulnerability
pushover analysis
dwelling house

Abstract

Many buildings, classified as dwelling houses, have been destroyed and the death toll considerable because of earthquake. The application of building codes and seismic resistant to dwelling is to ensure safety adjacent to earthquake by controlling risk. Furthermore, the development of lightweight concrete research had led to more reliable concrete with high strength concrete as well. The advantage related to earthquake is its weight which will reduce earthquake force for the structure using lightweight concrete. This paper discusses seismic risk of lightweight concrete compared to normal concrete in application to dwelling, especially in South East Sulawesi, Indonesia. The study conducted uses both combination of deterministic and statistical approach. It focuses on structural modeling of dwelling using lightweight concrete using SAP 2000 compared to normal concrete to establish structural behavior (deterministic part) due to earthquake force (statistical part). Failure mechanism will be performed by non-linear pushover analysis by taking uncertainty and variability of materials, dimensions and loads into account. Based on the result, seismic risk reduction factor for lightweight concrete is formulated and determined. In same location where they are modeled, it is found that dwelling with reinforced lightweight concrete performs better level of performance than reinforced normal concrete depended on the type of structure. Moreover, similar failure mechanism and ductility level are performed by both type of reinforced normal and lightweight concrete.

Landslides in coastal Uttara Kannada: Management towards risk reduction

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Keywords

landslide
Uttara Kannada
GARP
SVM

Abstract

The hilly coast of Uttara Kannada, interrupted with backwaters and river mouths, had no notable history of landslides until multiple slides struck Karwar during the rain-soaked early days of October 2009 causing live burial of 19 persons. That the proneness of the region to landslides has increased due to rising human impacts can be assumed considering the collapse of a hillside along Kumta coast during the peak rainy days of 2010 and in yet another incident near Karwar, boulders rolling down a steep hill hit a running train causing one death and injuries to others. A combination of factors may be blamed for the landslides that happened and likely to repeat, especially during days of excessive rains which are on the rise. Low lateritic coastal hills are formed of eroded and re-deposited materials from the Western Ghats through geological ages. Vegetation flourished on these hills until pressures from rising population and developmental activities erased bulk of it. The exposed soils of denuded hills got laterised through surface erosion, fine clay materials seeping down into the lower horizons leaving honey-combed iron rich, indurated surface laterite, a poor terrain for plant growth. The indurated surface laterite is an effective shield against landslides, except when deep vertical cuts are made exposing the soft clayey soil horizon beneath. The vulnerability of deposited lateritic hills to landslides increases if such deposits have taken place along the river courses or estuarine regions, causing capillary rise of water from beneath and descend of rain water through fissures and holes formed by rotten tree stumps. Rainy spells can soak up the soft soils in the interior triggering mudslides due to rupture of the hills, as is the case with the killer landslide at Kadwad in Karwar. Quarrying, pediment cutting, soil removal and stripping of vegetation increase risks. The granitic hills of Karwar coast are also posing potential landslide problems. The rocks here are of fractured type with ample pockets and cracks with trapped soils. Good forest cover could minimize risks. Deforestation in these is at its peak, caused erosion of top soil and water seepage into the interior of hills. Whereas the soils soak up and expand the granite rocks do not, unlike the laterite. Heavy rainfall acts as triggering cause for landslide hazards in such hills. Pediment cutting and quarrying add to the risk factor. Probable landslide prone areas in Uttara Kannada district and also in Kerala were predicted using algorithms GARP (Genetic Algorithm for Rule-set Prediction) and Support Vector Machine (SVM) in a free and open source software package — openModeller. Several environmental layers such as aspect, digital elevation data, flow accumulation, flow direction, slope, land cover, compound topographic index, and precipitation data were used in modelling. A comparison of the simulated outputs, validated by overlaying the actual landslide occurrence points showed 92% accuracy with GARP and 96% accuracy with SVM in predicting landslide prone areas considering precipitation in the wettest month whereas 91% and 94 accuracy were obtained from GARP and SVM considering precipitation in the wettest quarter of the year. To prevent landslide hazards, there should be accepted norms for each region, based on composition of soil and rocks, rainfall, quality and biomass of vegetation etc. Reduction of risk factor lies in providing appropriate vegetation cover, and any interference with the hills should be strictly adhering to norms of geology and ecology of the region.

Earthquake induced hydrological disasters

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Keywords

seismosediments
hydrological issues
downstream sedimentation
earthquakes

Abstract

The pervasive effects of earthquakes are destructive. Earthquake is a disaster and it gives rise to some other hydrological disaster. During moderate to large magnitude earthquake in ravine area, a hillock of part of mountain gets dislodged and falls in river bed. It creates a temporary blockade or temporary dam and the flow of the river gets blocked. Usually such temporary dams are not stable and give way within few days. If there is a dam downstream, then the entire debris of the temporary blockade gets deposited in the dam. This is known as 'Seismosediments' and the process are known as 'Seismosedimentation'. A number of moderate to large earthquakes in the Himalayan area have been associated with such happenings. The deposition of Seismosediments in the reservoir reduces the effective and useful life of reservoir, which adversely affects the water distribution and power generation. During recent earthquakes in India and neighborhood such as Uttarkashi earthquake, the Kashmir earthquake Sumatran earthquake and Bhuj earthquake etc. the effect of seismosediments was extensively observed. The effect lasts for few years. In case there is no dam downstream, then the Seismosediments are deposited on the bed and banks of river. After the 15 August 1950 Assam earthquake of magnitude 8.6, the bed of river Brahmaputra had risen by about 2.5 to 3.5 m. This adversely affected the entire river regime. During the 19th January 1975 Lahaul-Spiti earthquake of magnitude 6.5, the river Para-Chu was blocked by a huge landslide and a temporary dam of about 35 m was formed. The blockade gave way within few days and the effect of this was seen at Bhakra reservoir, situated at distance of about 200 km from the epicenter. Huge amount of sediments were deposited in Bhakra dam. During the 8 October 2005 Kashmir earthquake of magnitude 8.0 a number of reservoirs such as Tarbela, Mangla etc in Pakistan were heavily silted by Seismosediments. Bapat (1988) (Bapat 1988 Earthquakes and River Regime, Proc. Int. Conf on River Regime, pp 423–429, John Wiley) has given a mathematical formula to calculate the amount of seismosediments. There have been a large number of similar cases from seismically active countries in China, Japan, Chile, Mexico, Indonesia etc. It is proposed to discuss some of the cases. The formula and the process of Seismosediments could be used for realistic projections of lives of existing and planned reservoirs. When a tsunami-genic earthquake occurs and it generates large tsunami waves, the mouth and deltaic areas of rivers are adversely affected. The river delta gets fragmented and affects the flow mechanism of river water near the mouth of river. It is proposed to discuss these points in the paper.

Disaster management education in India

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Keywords

disaster education
CBSE
11th five year plan
disaster management curriculum
role of disaster education

Abstract

The world is becoming increasingly vulnerable to Disasters which can strike at any time, and place. Natural Disasters have especially, in the last decade increased significantly in magnitude, frequency and impact, Some of the recent disasters that have affected the education sector in India are the Gujarat earthquake, 971 students and 31 teachers were killed, 1,884 schools collapsed; Tamil Nadu. Fire incident where 93 children died in a fire due to explosion of a cooking gas cylinder; Kashmir earthquake (2005) where 17,000 students died at school, and 10,000 school buildings destroyed, no one can forget the school in Leha washed out in cloud bursting with many children recently. The event that unfolded in the Kumbakonam fire tragedy which took the lives of 93 children reiterate the need to have school level emergency preparedness and response plans, National policy on Disaster Management has also stressed the issue of educating professionals in this field. Government of India in its Tenth and Eleventh Five Year Plan document, have emphasized the need to enhance knowledge, skill and values to reduce the impact of disasters. The Tenth Five Year Plan emphasized the need for integrating disaster management in the existing education system. In addition, the government of India launched many disaster risk mitigation initiatives, amongst the inclusion of disaster management in school and professional education are important. The Central Board of Secondary Education (CBSE), has initiated Disaster Management in the school curriculum, with emphasis on first aid, search and rescue skills, disaster resilient construction practices etc. At the undergraduate level and above, some universities and Institutions are offering courses on Disaster Management. These includes the universities of Mahatma Gandhi University, Kottayam, Roorkee, Chennai, Pune, RTM Nagpur, IITs, Yaswantrao Chavhan Academy of Development Administration, National Institute of Disaster Management, National Civil Defense College, Tata Institute of Social Sciences, and Indira Gandhi National Open University. There are some other initiatives taken by Government of India to develop a model curriculum and organized seminar, workshops and conferences to educate the different strata of the society. NGO's are also imparting education through trainings. The investments in disaster education, public awareness, community leadership development, disaster education of unemployed youth, physically challenged, elderly, women and school children are essential. A large number of professionals require training and retraining for which we will have to generate quality teachers, text books, training kits, etc. This will call for innovation in disaster education, Disaster Management Education in India is still in its infant stage it is needed to take out from the classroom to the open community and from formal education to the informal education to the entire community because, Disasters brings along with them heavy loss to life, property and livelihood. So it is time to make disaster management a way of life.

A disaster management plan for Moonnilavu Grama panchayath with special reference to landslides

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KEYWORDS

landslides
hazard zonation
susceptibility analysis
mitigation measures

ABSTRACT

The frequency of disasters due to landslides in hilly areas, foothills of midland and highland are increasing year after year. The western flanks of Western Ghats covering the eastern part of Kerala is identified as one of the major landslide prone areas in the country. This study attempt to prepare a disaster management plan for a grama panchayath with special reference to landslides, with the help of landslide hazard zonation of the area. The frequency ratio method were used for the hazard zonation and landslide susceptibility analysis. From the study it is found that around 48.37% of the study area is in critical and unstable landslide susceptibility zones and the slope and soil thickness are the most important parameters influencing landslides and the heavy rain during the monsoon season is the main triggering mechanism. Also landuse practices such as contour bunding, terracing and slope cutting increasing the landslide vulnerability. Unlike other natural disasters were restoration may be feasible, landslides usually create permanent unstable sites that often suitable only for designation as undevelopable open space. In this paper we consider mechanisms to reduce the impact of landslides as will as an effective landslide management strategy suggested.

Environmental risk assessment and vulnerability analysis of tourism in a high altitude destination in Kerala, South India

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KEYWORDS

Western Ghats
sustainable tourism
endemic species
species vulnerability

ABSTRACT

Vulnerability is a function of the prevalent hazards and the characteristics and the quantity of resources at risk to their effects. Vulnerability assessment results in an understanding of the level of exposure of people and property to the various natural hazards identified, including physical assets, the loss of potential crops, trees, livestock and fisheries. Klein and Nicholls (1999) have suggested that vulnerability is multi-dimensional, with biogeophysical, economic, institutional, and socio-cultural elements. The vulnerability of a system to climate change is a function of its exposure to negative effects and its ability to cope with those effects (McCarthy *et al.*, 2001). Tourism is an important industry in Kerala for economic growth, tax revenues, and foreign exchange earnings. Vagamon located in the border area of Idukki–Kottayam districts of Kerala is a rising tourism destination in the High range regions, scattered at a height of about 1,100 metres above the mean sea level with delightfully attractive meadows, open forests, waterfalls and valleys. This area is unique for its grasslands with laterite soil type. The marshes and *sholas* are being drained, cleared and filled at an alarming pace. The marshes that act as 'sponge' by absorbing and storing water are fast vanishing. Introduction of tourism development activities should not result in deterioration of the ecology of the hills. Extensive developmental activities like road construction in hilly areas will undermine the stability of hill slopes and may cause hazards like landslides. Hence the concept of sustainable development is very relevant for hill areas. The study presents an assessment of the vulnerability of the tourism sector in Vagamon and its impacts to the natural ecology. Vagamon is a hilly grassland area coming as part of Western Ghats; the biodiversity rich endemic area. The total land use of the study area is calculated as 104.3 sq. km. Majority of the land area consists of open scrub with the land area 76.4814 sq. km in 1967, which is reduced to 71.4873 sq. km. in 2009. The quadrate analysis for the quantification of trees, herbs, shrubs and seedlings and the grasses respectively. There were 8 species of trees were identified with *Memecylon* and *Cinnamomum* with great frequency of occurrence and *Syzygium cumini* with lesser frequency of occurrence. The high relative basal area is observed *Syzygium cumini* and it also shows high important value index (IVI). The Vagamon grasslands, coming under part of western ghats area consists of 44 sps. of RET species with special ecological importance, of which 22 sps. were rare, 9 sps. were threatened, 6 species were vulnerable, 2 sps. were endangered and 5 sps. were possibly extinct categories. There are 59 species of birds observed in the study area by extensive field works in the area under investigation and the identification of birds is based on identification key and standard field guides. 28 sps. Of southern Indian birds are classified by Birdlife international are globally threatened with extinction (Birdlife International 2001, 2003). The grasslands are considered as one of the most important bird habitat in southern India. A total of 112 species of butterflies belonging to five families were recorded during the study period. The family Nymphalidae dominated with 44 species followed by Lycaenidae (24), Hesperiidae (19), Papilionidae (13) and Pieridae (12). This included four species endemic to the Western Ghats. Since the late 1980s, sustainable development has become indispensable in development studies in general and in tourism research in particular. The sustainable tourism is essentially an issue of managing visitor numbers, activities and behaviour and to prevent an unacceptable level of environmental degradation, resulting in a subsequent loss to the economy and culture of the area. The concept of carrying capacity is the long-established mechanism by which sustainability may be gauged (Hunter and Green, 1995; Lindberg *et al.*, 1997; Wright, 1998).

A study on the stability of slopes under seismic conditions

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KEYWORDS

slope stability
seismicity
embankment slopes

ABSTRACT

Considerable attention is being paid in seismic slope stability and permanent displacements of natural and man made embankment slopes. The failure of earth dam or natural slope during earthquakes can lead to significant losses. Also major damage without failure can have serious economic consequences. Hence, the seismic performance of these structures requires appropriate evaluation during their design. Such performance is best evaluated through an assessment of the potential for seismically induced permanent displacements. These displacements depend to the large extent on geotechnical properties of slope material and strong ground motion parameters during an earthquake. This paper presents numerical studies on response of slopes due to dynamic loading based on finite element analysis. Model embankments of both cohesionless and cohesive soils have been considered. The parameters selected for the dynamic analysis include slope heights of 5 m (low embankment) and 18 m (high embankment) and slope angles of 30°, 35° and 40°. The effect of earthquake ground motions of different amplitudes and frequencies in the range of 0.1 g to 0.4 g and 1 Hz to 4 Hz respectively have been studied. The model slopes are analyzed for their stability under static conditions as well dynamic conditions. The results are presented in the form of factor of safety against slope failure under static and seismic conditions and settlement of crest of slopes. Based on the analysis, it is found that increasing displacements occur in slopes with increasing amplitudes of vibrations. However, maximum displacements have been observed in slopes of high embankments (18 m) at a frequency of 2 Hz when compared to low height embankments. Further, increased amplification of accelerations at the crest of the embankments have been observed in the case of both low and high embankments.

Interface between research and action: A case study of Tamilnadu in the context of Indian Ocean Tsunami

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KEYWORDS

gender issues
women needs
practice and research in disaster management
gender analysis
social inclusion

ABSTRACT

This paper is an endeavour to focus on how research unearths the implications of gender inequalities and discriminations during and after disasters. Research in this sense becomes a powerful tool of advocacy for changes at the policy and programmatic levels. Programmes which remain rooted in gender research do pave the way for far reaching changes in gender roles and relations at all phases of disaster response. Catastrophic natural hazards like tsunami provide unique opportunities to look at the consequences of the pre-disaster gender vulnerabilities For example, disaster like tsunami occurs in nature but its impacts are shaped by the social world in which it occurs. For example, Women died more than men, women became poorer relative to men, women's loss were not assessed and documented, women's specific needs, including reproductive health needs, did not attract the attention in the initial phases, there were adverse consequences of male dominated relief distribution and needs assessments. The entire gamut of gender based disadvantages and its long term consequences on women and gender relations needed wider research so that intervention at all phases of recovery could be well directed towards mainstreaming women's gender interests in the recovery process. The present paper which elucidates the gendered issues of tsunami is based on a field based study which was supported by Oxfam and carried out by a team of independent researchers. The purpose was to generate a body of knowledge by articulating issues through participatory research process. This was done to have effective interface between research and practice; to bring in corrective steps to engender policies which would further the gender equity in both disaster recovery and development processes. Apart from articulating issues, the research also focuses on the best practices of the NGOs in the direction of gender mainstreaming: the concrete outcome of research guiding the practice. This paper brings in several case stories, from a gender lens, of major gender issues which were unpacked through field based studies and the best practices which challenged the entrenched existing institutional norms at the community, market and state and family levels. The issues range from higher mortality rate of women relative to men and its far reaching effect on the status of girls, absence of women specific clothing and sanitary needs to that of their home based occupations in the loss assessments and recovery processes. The issues also bring forth how the aid remains skewed in favour of men for the simple reason of women's pre-disaster weaker social, political and economic status relative to men, thus reinforcing the existing gender inequalities. As well as underscoring the interface between practice and research through field based examples, the paper shows how gender as an analytical tool could be used to analyse the complex-yet-largely-ignored-phenomenon of gender relations that shape political, economic and social realities affecting women and men differentially.

Geotechnical assessment of disastrous landslides occurred in mid of September 2010 at different places of district Bageshwar, Uttarakhand

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KEYWORDS

geotechnical analysis
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Uttarakhand

ABSTRACT

Numerous landslides, land erosion and subsidence occurred at different places of district Bageswar, Uttarakhand in the month of September 2010 initiated by heavy rainfalls and cloud burst disaster caused 19 human deaths, widespread damage to human settlements, cultivated lands, irrigation canal, bridge, village foot tracks and major communication routes. More than 50 major landslides classified as rock slide/fall, debris slide, rock-cum-debris slide, and slope wash debris flow and bank erosion of different *nalas*/streams have been recorded. The slides have resulted in huge debris flow that flooded and deposited over human settlement, communication routes and cultivated lands. The studied data that steep slopes, high relief, thick slope wash material/overburden, complex fold, numerous faults and proximity to thrusts rendered the slopes highly vulnerable to mass movements. Further, anthropogenic activities and varied geological, hydrogeological, slope erosion and structural conditions have created adverse conditions for numerous debris slides/falls. The paper as a special reference has discussed a major landslide named as '*Killer landslide*', which occurred on 18 September 2010 and hit a private primary school, Saraswati Shishu Mandir, at Sumgarh village, *Tehsil* Kapkot where in 18 children of Classes I and II died (buried alive under tonnes of rock debris) and over 25 children got severely wounded. Generalised suggestions and recommendations have also been discussed for mitigation of this problem so that the recurrence of damage caused by similar incidences in future can be minimised.

School and community horticulture enterprise — A livelihood option to ensure food security, sustainability and improve child nutrition

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KEYWORDS

food security
agriculture
child nutrition

ABSTRACT

A large part of the rural economy in India is dependent on agriculture. At present, the livelihood of many farmers owning marginal and small land holdings is at threat because of the low productivity of the land and depleting natural resources due to frequent **droughts**, making subsistence farming non-remunerative. Farmers in Karnataka have limited access to credit and opportunities to address the social and economic needs of small farmers have been few and far between. However, the emergence of Self Help Groups (SHG) has enabled rural women to have access to micro-financing. This has created several opportunities for women-led initiatives in rural areas. In light of such circumstances, the School and Community Horticulture Enterprise (SCHE) in support with Sir Dorabji Tata Trust (SDTT), initiated by Technology Informatics Design Endeavour, a Bangalore based NGO, is aimed at using greenhouse horticulture as a viable livelihood option for small and marginal women farmers, who are within the economically weaker section and belong to a socially backward community in the Tiptur Taluk of Tumkur district. The area is a semi-arid region and water levels have gone down in the recent past due to climate change induced droughts which lead to water scarcity and large scale exploitation of groundwater. The objective of the project is to ensure **food security** through **sustainable agriculture** and to improve child health by contributing to the national mid-day meal scheme for school children, thereby increasing the **nutritional** food intake of school children. Thus, the project created a viable income generation opportunity for women with access to small land holdings, which they use to grow high value and low volume/low value and high yield crops, earning about Rs 30,000–40,000 per year in a greenhouse structure of 200 sq. m. area. The roof of the greenhouse has been used to collect rainwater, which in turn is used to irrigate the crops in the greenhouse through a drip irrigation system. The SCHE project motivated the women to donate about 10% of their produce towards the mid-day meal scheme (which was initiated by the Government in 1995, to improve enrollment and child health and was not been significantly successful due to poor nutritional quality of the meal). This improved nutritional quality by providing additional 50gm of vegetables/child/day and papaya fruit grown in open field. This act of charity empowers the women by earning them respect and support from the community. This has already been implemented in ten schools in Tiptur Taluk of Tumkur district, Karnataka State. The enterprise supported about 380 lower primary school children, which also led to an increase in attendance as well as an improvement in the health of children. The project is conserving about 13,50,000 litres/year and saving about 1230 kWh of energy/year, which is equivalent to 904 kg of CO_2, and results in a significant reduction of carbon footprints. Simultaneously being energy saving and water securing oriented, the project has created an environment friendly, economically viable and socially acceptable livelihood alternative, leading to sustainable agricultural development and food security. In addition, the projects multi-faceted benefits also include the provision of viable options to marginalised farmers, addressing women's empowerment and improve children's health in rural areas, thereby having the potential to bring about social, cultural and economic transformation.

Safer schools, safer hospitals and safer people — a people-centered disaster management approach

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KEYWORDS

over-population
DM act
safe hospitals

ABSTRACT

We live in a World which is buffeted by natural and man made disaster. No country or individual, rich or poor, is immune from disasters. People in India are highly vulnerable to disasters due to unsafe buildings, over population, poverty and lack of awareness and education regarding enhancing threats of disasters. There is a growing evidence to suggest that disaster occurrences have undermined safety of schools and health facilities most. It is important to understand that schools and hospitals are interface between the community, the people in governance, and private sector, and perform different functions. Schools and Hospitals are much more than brick and mortar. They are home to build knowledge of the youth in safe environment and to provide critical health services when these are needed most in disasters. These are the settings in witch school children educate, grow and build themselves towards the path of progress and prosperity, also, health workers work tirelessly to ensure their dedicated services to patients impacted by disasters in hospitals. Schools and hospitals also have a symbolic social, economical and political value and contribute to a community's sense of security and well being as such, they must be protected from avoidable consequences of disasters, emergencies and crises. In assessing India's proneness to natural and man-made disasters and vulnerability of its schools, hospitals and people, it is noted with concern that India and disasters are some how conterminous over centuries, yet, least prepared. To deal with such a scenario of continuous threats and consequences, in past 5 years or so there has been a purposeful swing in the process of disaster management nationally. The disaster management act of year 2005 (DM Act 2005) lays down mechanism for effective emergency response at the national state and district levels. Also, there has been rich contribution by UNISDR, experts, academia and technocrats to guide people in governance and prepare needed human resource to put the process of disaster risk reduction in its needed priority. It may be a good beginning, yet too little and too slow for millions of people at grass root level. This study of Saritsa Foundation, s campaign argues that mainstreaming people in the process of resiliency involves weaving them together which will transform Hyogo frame work of Action in to a reality to have safer schools and safer hospitals and safer people. The campaign study analyses importance of people centered and decentralized approach which is a paradigm shift from 'Top to Bottom' methodology of resiliency to disasters which has been conventionally practiced, to 'Bottom up Ward' approach. It entails a new set of innovative and analytical ways to develop safety culture amongst people by building their capacity. It also strengthens the principle approach adopted at Global Platform for Disaster Risk Reduction (UNISDR) 2009 which priorities that 'Critical services and infrastructure such as health facilities and Schools must be safe from disasters by 2015'.

Flood disaster preparedness & response: Experiences from the Padma riverbank areas of Bangladesh

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KEYWORDS

flooding
vulnerability
flood proofing measures
adaptability
disaster preparedness

ABSTRACT

This paper outlines a part of a research and design project based on work undertaken for the B.Arch. at the Department of Architecture, Bangladesh University of Engineering & Technology in 2007–08. This study starts with the intention to ease the life style & settlement pattern of the rural dwellers of the river bank areas respond to hazards like floods. Floods in the deltaic valley of Bangladesh is not merely an environmental issue, they play with the very fate of the nation, not to speak havoc they wreak on the economy of these bank side areas. The findings of the study can be integrated into establishing official flood management measures to effectively manage flood disasters in flood prone areas which would greatly reduce flood losses. Bangladesh is one of the most vulnerable countries to climate change due to its geographical location and geomorphologic conditions. Popularly known Bengal Delta formed by three river systems which is repeatedly affected by climate change through recurrent natural hazards. As floods are climatologically phenomena thus persistence of higher rainfall can lead to greater intensity of regional and local flooding. Floods in Bangladesh are a complex phenomenon. They pose enormous threats to the population through loss of life and economic damage, but at the same time, moderate floods contribute to the fertility of the land. Flood hazards of bank side areas of rivers are difficult to control through structural measures; Flood proofing through assistance to self help measures to reduce the damage to property and stress are largely accepted preventive efforts that these people have practiced. Adaptations towards the impact of climate change could make them quite self-dependent in facing disasters. This paper focuses on formulating future action plans and some immediate incentives to improve the physical environment that are better suited to the people of river bank areas with frequently changing context. To develop a self-sustain community and an adaptive building-for-safety in response to observed or expected changes in climatic stimuli beside the riverbank areas, study goes through the geo-morphological & hydrological analysis and vulnerability assessments of built form in this area. Finally goal is to provide zoning guidelines through flood level predictions & suitable shelter options which would help the peasants at the time of emergency.

Orissa tornadoes: Select discussions

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Keywords

Tornado
Brownian motion
Orissa

Abstract

In the year 2005 May, a tornado was recorded in the western fringe of Bhubaneswar city (20.15°N/85.52°E), Orissa, known as Ghatikiya. No loss of life or property was reported. Farm land was marginally affected. Figure 1 is the scanned image of the said member when it had full scope form. On that date in the following hours a severe storm had hit the city centre, which is to the SE of the location of the event. We can see the background is bereft of cumulus clouds, while the stem of the tornado is connected to a patch of black cloud. The base is churning up large volume of dust/sand and is rain less. The top mid portion is visually less opaque i.e., it is less dynamic region in the whole system, which is why, the structure bends therein. The event is progressing over near flat land which is covered with deciduous shrubs. Bhubaneswar is core cyclone region. Tornado presents quite a contrasting picture and mechanical structure from that of the cyclone. Both the Tornado events were of <15 minutes duration each. In Figure 3 we see a tractor has turned turtle. Both are iron make machines and weigh $>\frac{1}{2}$ MT/each. In spite of a narrow cross section, a Tornado (within the stem) inflicts a 'lift' to any object irrespective of its weight. Such 'lift' phenomena was not encountered even during the event of the Super Cyclone of October 1999. In this instance too rooms, hutments and even concrete structures with ajar door and windows suffered, while that and those which all were firmly shut from within (by inmates), and were not affected. However, vehicles turning turtle remains to be explained. We examine published literature, interview a wide range of experts and field examine the events. Our finding is that (i) vehicles/firm implements (excluding *sagadas*-bullock carts), fishes, bovines and other ruminants were lifted and thrown asunder (ii) whereas, that and those which did not have inflated tyres or large air-way systems were not effected (iii) human casualty indicated extensive pulmonary rapture, cerebral hemorrhage and asphyxiation. We know the stem develops a 'atmospheric low' of the order 800–600 hPa. Tyres have a positive pressure ∼32 psgi. 1 psgi = 6.894757 (say 7) hPa. So the gross contrast between the inflated tyres interior coupled with that of the transient low created by the Tornadoes stem works out to $(32 \times 7) = 224$ hpa + 200 (1000–800)= 424 psgi less than that of the mean sea level pressure. This makes the trapped air within the tyres act as compressed air bubble(s) locked in fluid bed. Compressed air tries to come out at a force of 424 psgi. This imparts very high buoyancy to the inflated wheels and inflicts a rotary motion to gain the preferred place of position (in relation to the aberrated atmospheric column pressure). Bulk mass modulus shifts and centre of gravity alters in a reverse manner along the vertical. The item then becomes air borne. In the case of the jeep the hind becomes relatively more buoyant. In the case of the tractor the large wheels play the decisive role. A combined play of the principles of Pneumatics, Fluid Mechanics and Brownian motion manifests in nature. Tornadoes in coastal Orissa is a meteorological member of the Spring equinox period.

Creating public awareness about earthquake and precursors

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Keywords

earthquake precursors
prediction and warning
biological sensors
community awareness

Abstract

Experience from previous destructive earthquakes in India indicates that the Government Administration comes in picture with the masses only during post-seismic periods. This is mostly for rescue, evacuation and providing food, cloths, tents, blankets, medicine etc. This was seen during Latur (1993), Bhuj (2001), Andaman (2004) and Kashmir (2005) earthquakes etc. Such post-seismic measures do not help in alerting the people and mitigating the seismic disaster. If common people are educated and informed about some reliable seismic precursors, it would help in saving lives of several people. There are some reliable seismic precursors which every person could see. If people are educated they would prepare to face the seismic contingency. A pamphlet for this has been prepared and it is intended to be released in seismically active states in India. The precursory parameters are divided on time axis and not by the nature of the parameters. The Seismo-electromagnetic precursor on reception of radio waves is seen about 60 to 100 hours before earthquake. The same effect for television in the form of audio, visual and spectral disturbances is seen about 10 to 12 hours before the earthquake and the same is found in the form of malfunctioning or non-functioning for mobile telephone about 100 to 150 minutes before the earthquake. Abnormal animal behavior is observed about 10 to 12 hours before earthquake. Similarly, human medical precursors are seen about 15 to 20 hours before earthquake. When such precursors are seen at a particular place people should telephone nearby location within about 20 to 30 km radius and verify whether such precursors are also seen at several places in the radius of about 20 to 30 km then it would reasonable to expect the occurrence of a medium to large magnitude earthquake. Appearance of unusual 'earthquake clouds' occurs about 10 to 30 minutes before the earthquake. These clouds are of unusual size, shape and colour. Such informative pamphlet would be translated in the regional language and would be distributed to large number of people.

Nanotechnology — A new frontier for food security in socio economic development

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Keywords

sustainable agricultural nanotechnology in food sector food security in ecology in bio-magnification in social life

Abstract

Agricultural sustainability is facing challenges both in respect to food security and ecological vulnerability all over the world. Day by day the recorded food prices have been noted while the food production seems to be drastically low. This brings out the issues of sustainability covering both agro-ecological and socio-economic indicators. It has been observed that the number of hungry people will be more than one billion within 2015. Naturally, so many technologies are being adopted in the agricultural field to boost up the food production. In this context one of the most recent and unique technology — Nanotechnology, has been adopted in the field of agriculture. The applications of nanotechnology in the food sector are newly adopted and its future is highly predictable. This technology has been adopted by several companies for exploring the potential of nanotechnology for use in food or food packaging. As we know that the nano means 'dwarf'. Nano particles are engineered materials. Its structures and systems that operate at a scale of 100 nanometers (nm) or less (one nanometer is one billionth of a meter). This nanotechnology can break through in food sector by producing nano food, nano food packing, nano farming, etc. Still several leading scientists would like to predict that this technology may create some risk in ecological, health and in socio-economic sector. In the present decade it has been observed that the use of the nanotechnology can create some toxic effect in food chain, in bio-magnification and also in food web. Naturally, it should be look out the toxicological effect of this great technology. Thus the article has been dealt with the prospect of this nanotechnology in food sector as it is related with the socio economic development. Several reports helps to propose, the use of this technology can penetrated in the food chain and also can alter the normal processes of energy flow. In this point we have to think the use of nanoparticles in a proper way otherwise natural disaster will appear in the society in future.

Creating an empirically derived community resilience index for disaster prone area: A case study from Orissa, India

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Keywords

disaster resilience disaster index

Abstract

'Resilience can be understood as Capacity to absorb stress or destructive forces through resistance or adaptation l capacity to manage, or maintain certain basic functions and structures, during disastrous events l capacity to recover or 'bounce back' after an event . 'Resilience' is generally seen as a broader concept than 'capacity' because it goes beyond the specific behavior, strategies and measures for risk reduction and management that are normally understood as capacities. However, it is difficult to separate the concepts clearly. In everyday usage, 'capacity' and 'coping capacity' often mean the same as 'resilience". The State of Orissa is located in the eastern coast of India at 17° 49′ N to 22° 34′ N Latitude & 81° 29′ E to 87° 29′ E Longitude. The state is divided into five morphological units: Mountainous and Highlands Region, Coastal Plains, Western Rolling Uplands, Central Plateaus and Flood Plains. It has been found out that the state is hub of disasters. The state was recurrently victimized by climatic chaos (floods, droughts, flash flood, cyclone, heat wave, high risk zone for earth quake & lightning) causing people more vulnerable and pushing state development more backward. Magnitude of poverty, hunger, trafficking, distress migration followed by social exclusion has widened the development gap many fold, despite the presence of rich resource base. At this context, there is an increasing need to determine which community characteristics are most resilient to disasters. This research paper proposes method to quantify community resilience. The factor analysis method results in a weighted additive index model of 10 variables to derive district wise community resilience. These variables are from five capital groups namely Social Capital, Economic Capital, Human Capital, Physical Capital and Natural Capital. From each capital two variable are taken for index these are Rural School, Health Center, Par capital income, % of Below Poverty Line Families, Educational attainment of the population, which can be (measured by the number of years of formal schooling of the average person), Migration, People having concrete House, Road density, Forest cover and Access to safe drinking water.

This study represents a preliminary attempt in quantifying community resilience. It outlines the method that can be used to define resilience index and offers a general guideline about the variables that might contribute to a communities ability to recover from a disaster. The 30 districts of Orissa is ranked according the score and categories the districts in five groups i.e. least, low, moderately, high and highly resilience.

Building climate resilient cities: Learning from abroad and present response mechanisms in Indian cities

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KEYWORDS

climate-resilient cities
NAPCCC
DRR

ABSTRACT

Climate Change as it relates to cities is an important issue for discussion today considering the likely impacts of climate change that we have already started experiencing and would experience in the coming future. Half the globe is urban today and three quarter of carbon dioxide in the world, which is the biggest greenhouse gas is emitted by urban areas (Darryl D Monte, 2007). Cities are known to be highly energy and resource intensive entities, besides being the economic hubs of the country. Cities account for 1/6th of the freshwater the world guzzles, a quarter of the wood harvested and two fifths of the material and energy flows. According to the IPCC (2007), cities are responsible for 26% of direct greenhouse gas emissions. Also, the global rise in temperature, more frequent extreme events, rise in sea level and glacier melting, all impacts of climate change, put the cities to threat subsequently putting to threat the very economic basis of many a developing countries. It is therefore essential to have concern about the issue of climate change (one of the important and irreversible by product of environmental imbalance) specifically in terms of how it relates to cities and urban areas. Current government policies and urban development patterns encourage sprawling and auto dependent development, which in turn becomes the root cause for GHGs emissions, and subsequent global warming and climate change (Reid Ewing *et al.*, 2007). Climate change is a global issue but its impact and its cause are rooted somewhere at regional and even local level (Changnon, 1992). Responses range from adaptation, mitigation and Disaster Risk reduction and preparedness. While disaster preparedness — risk reduction and mitigation has gained attention all over the world, similar attention to adaptation strategies is yet a distant dream. More over the discussions within the scientific community increasingly suggest an integrated approach towards responses to climate change to reduce risks and vulnerability to urban population, particularly the vulnerable urban poor and slum dwellers and to build resilient cities. Many Governments in the west have taken initiatives and offer a lot of learning from their own experiences and strategies that they have adopted as a response to current climate variability and future climate change. Some of the typical example would be the Plan NYC-2030 (New York City); The City of London Climate Change Action Plan, Climate Change Adaptation Strategy-2006 for the city Durban. In India, the launch of the National Action Plan on Climate Change (NAPCCC) with its 8 Missions that target various important sectoral interventions has brought about a significant change in the way India views climate change and sets the ball rolling to combat climate change impact in a holistic way. This paper however, focuses on how Indian cities are prepared to respond to the new threat of climate change and variability. Citing example such as the Components of National Mission on Sustainable Habitat, The Delhi Climate Change Agenda, Initiatives at city levels like that of city of Surat in Gujarat and non-government externally funded initiatives like that of Asian Cities Climate Change Resilience Network (ACCCRN), the paper captures insights on the challenges and opportunities that emerge from these initiatives. The paper also captures the western examples and draws synergies for Indian cities from these initiatives. The paper significantly contributes to the conference by differentiating in the way the problem is approached in the many examples cited and draws learning for Indian Context to help build resilient cities and before that help build integrated holistic mechanisms to adapt, mitigate and reduce disaster risk and vulnerability of cities in India.

Community health risk assessment on mercury contaminated fish consumption at Cochin backwaters

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KEYWORDS

estuary
mercury
fish
health risk assessment

ABSTRACT

Concern over potential human health risk of mercury associated with fish consumption has led many nations to issue consumption advisories and limits. Dietary survey over populations can provide essential information for exposure assessment, risk characterization and risk management. The current study focuses on human health risk assessment associated with the mercury contaminated fish consumption by human population living at the banks of Cochin backwaters. Fish samples were collected and analyzed for mercury content following standard methods. A random survey was conducted to evaluate the fish consumption rate and health status among the people. A total of 227 peoples of 44 years (average age) and average weight of 56 kilograms were surveyed. The mean methyl mercury (MHg) concentration in the edible parts of fishes was 0.67 mg/kg (wet weight) and the mean total mercury (THg) concentration was 1.03 mg/kg. The estimated fish consumption rate was 34 mg/day which is slightly higher than the national average of 30 mg/day. The hazard index calculated for the mean concentration of total mercury as per the present study was 2.09, which indicates a high risk to human beings. The intake of methyl mercury calculated in the study was 2.85 microgram MHg/kg body weight/week which is much higher than the reference value suggested by FAO/WHO-JECFA, US, Canada and Japan. The health survey conducted on symptoms of mercury poisoning has indicated no adverse effect so far on the sample population of this region.

Urban intervention for an eco-city based on its water bodies: case study — Dhaka, Bangladesh

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Keywords

water bodies
urban intervention
urbanization
transformation of water bodies
eco-city

Abstract

Bangladesh the largest delta in the world is a land of Hydraulic civilization. The capital city Dhaka was built based on its water culture. Water culture has paid powerful role shaping the histories, societies and economics. Bangladesh is worlds largest delta system and has the greatest flow of river water to the sea of any country on earth. Water Urbanism is one hand is the Science of a city and on the other hand it is the discipline that holds the capacity to steer the transformation of the city and to design rational development. Dhaka the capital of Bangladesh is the seven largest populated city of the world which was initially established based on its water bodies in the 14th Century. The establishment is evident from the 7th century. The city is bounded by three rivers all around. This was a city of more than fifty canals and many ponds even in the 1950s. As the largest delta of the globe it is common to have many water bodies in this low country. The huge rate of urbanization and the so-called modern city actually concurred water based city and the dialogue between waster and city was collapsed. Water appears to be one such issue that is (re)conquering the contemporary agenda of urbanism. Now it is not surprise as we are constantly reminded of the consequences of global warming and rising of sea levels, uneven distribution of resources. Water bodies suppose to be the life of the city which should work as the line of communication, natural drainage and ecological space. These water bodies and surrounding area should be the major open spaces and space for recreational facilities of the city. Over the last few decades the cityscape of Dhaka, the capital city of Bangladesh, has been experiencing a transformation in terms of its water system due to rapid and uncontrolled urbanization. The paper will focus on understanding of water culture of the deltaic city of Dhaka and analysis the metamorphosis of water bodies of Dhaka city. Over the last century the city's water bodies had transformed enormously due to urbanization especially in last 20 years. The paper will look for the city water bodies evolution with growth of the city and impact on urban life. In the second phase of the paper after synthesis searching for possible reclamation of water bodies will be taken in to account. The paper shall look for an urban design solution for an eco-city based on its water.

21st century tech — Transforming community engagement in disaster preparedness, risk reduction and response

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Keywords

SMS
GPS
crowd sourcing

Abstract

Community engagement is increasingly recognised as a pre-requisite of good disaster preparedness, response and recovery, yet remains a major challenge for humanitarian agencies and governments alike. Some perceive the advantages offered by new technologies such as GPS handsets and smart phones in communicating with communities, and are beginning to invest large amounts in developing or purchasing commercial systems and equipment. Yet this ignores the increasingly wide reach of the mobile phone, accessible to millions through village phones, family members, and local enterprise. Mobile coverage is increasing year on year. Furthermore, SMS is increasingly the go-to technology for populations seeing an opportunity to save time and money — witness the huge success of mobile banking in Kenya and Pakistan, and the level of trust in the technology which that implies. FrontlineSMS is free, open-source software available to not-for-profit organisations all over the world, which allows them to turn a computer and a mobile phone or GSM modem into a communications hub cable of interacting in sophisticated, responsive ways with hundreds of individuals. The software is designed to be picked up by any user swiftly, and interacts with users on the ground using normal text messages — no other costs, equipment or training are needed. FrontlineSMS has been used for early warning systems, security alerts, SMS helplines, and data collection, among hundreds of other uses in disaster response and risk reduction contexts since downloads began in 2007. This paper explores user case studies, including those utilising complementary technology such as Ushahidi, in depth and explains how agencies responding to emergencies can use SMS to communicate with the people they are working with. More recently, however, FrontlineSMS' sister projects in health, mobile money, and legal services have built sophisticated data management tools on top of the core platform which allow organisations to run complex databases without ever needing an internet connection. The case study concludes by setting out how such databases could allow administration of aid distribution, including cash transfers, saving time and money in data entry and travel time; and how creating responsive, automated SMS communications systems can potentially empower communities to monitor programmes, contribute to data flows, and report on their progress. In time, a tool as simple to use as FrontlineSMS could be given to local organisations and even communities, to enable them to organise themselves to improve resilience. The potential for SMS in disaster preparedness has arguably only begun to be explored.

Combined effect of both Arctic and Antarctic sea ice variability on the summer monsoon rainfall over India with special emphasis on extremes

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KEYWORDS

Antarctic circumpolar wave
Mean meridional transport of heat
Indian summer monsoon rainfall

ABSTRACT

Polar sea ice is an important component in the global climate system through its modifying role in radiative, energy and mass exchange processes. The All-India summer monsoon rainfall (AISMR) that caters to the well being of over a billion people in the subcontinent is considered to be yet another significant and a well known global phenomenon. The sea ice data is obtained from the microwave sensors Scanning Multichannel Microwave Radiometer and Special Sensor Microwave Imager during the period 1979–2005. The sea ice extent (SIE) variability of Kara & Barents Seas (KBS) sector in the Arctic and the Bellingshausen & Amundsen Seas (BAS) sector in the Antarctic during boreal winter and austral summer respectively seems to have an influence on the overall behavior of AISMR. It is observed that the KBS SIE in the month of October is positively correlated (correlation coefficient = 0.5, significant at 99% level of confidence) with the subsequent AISMR. Whereas, the BAS SIE averaged over the months of October, November and December is negatively correlated (correlation coefficient = −0.47, significant at 98% level of confidence) with that of the ensuing AISMR. The polar sea ice linkage with the tropical AISMR comes through the mid-latitude forcing, namely, the Europe surface pressure anomaly tendency and the Antarctic circumpolar wave in the northern and southern hemisphere respectively. This study is aimed at understanding the combined effect of both the Arctic and the Antarctic sea ice variability on the performance of AISMR. Composite analyses of polar atmospheric and oceanic parameters show prominent features with respect to the extreme cases. Multiple linear regression analysis carried out using KBS SIE and BAS SIE as independent parameters provide results that give us confidence in using polar sea ice variability in both the hemispheres collectively as potential predictors for the long range forecasting of summer monsoon rainfall over India.

Community-based emergency medical care and disaster preparedness and child emergency medical care and disaster risk reduction in East Godavari district, India

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KEYWORDS

emergency medical care
school safety map/net
vulnerability
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disaster drills

ABSTRACT

CADME a coalition of 20 organisations working to mitigate the effects of natural/man made disasters. The actors involved are 28,412 children and 36,116 adults from 25 disaster prone villages and 25 vulnerable schools, district education department, district fire department, mandal revenue office, mandal development office, district fisheries office, 150 teachers from the 25 vulnerable schools, state disaster management authority, district women and child welfare department. This is a good practice, because: The project is a model to all the vulnerable communities in the country and children studying in vulnerable schools. Capacities of vulnerable communities are increased and confident of combating the disaster situations. Dependency on outside people, like Police, Medical teams, Military for rescue and Medical aid has been reduced drastically. Relief measures to be taken up in the event of disaster are taken care of by Taskforce groups, not depending on outside help. Able Bodied persons in vulnerable villages have specific responsibilities and actions in pre-during-post disaster situations. Women are very active and 50% of women are involved in each taskforce team. *What have been the key success/failure factors of this initiative?* All the 30 taskforce groups at village level are capacitated to combat the disaster situations (pre, during and post) with specific roles and responsibilities in each situation. Disaster drills are organized at regular intervals to familiarize them with their taken tasks and responsibilities. Contingency plans are updated every two months. Local bodies of each village have taken into consideration of the work done by task force group at their respective villages. Contingency plans developed by taskforce groups have been approved at local, mandal & district levels for spontaneous actions in collaboration with government officials for quick response. A joint taskforce committee consists of local task force and government officials at panchayat level, mandal level and district level have been formed to address the problems. What are the innovative elements and results? Cost Effectiveness: There is no need to purchase anything form outside to implement this initiative at vulnerable villages. Task force groups are well versed through the training and how to prepare the floating raft, using the local material like, gunny bags, damaged wooden flanks, waste glass bottles, and torned saris and so on. They are also trained to use waste cloth to be used as bandages for chin, knee head injuries and chest arm and leg fractures. They also construct a floating aid which can rescue two drowning persons with two plastic pots and a rope.

Women empowerment and reshaping disaster

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KEYWORDS

gender
women-empowerment
Uttarakhand

ABSTRACT

This impact of natural disaster and climate change is disproportionately affecting the livelihoods and security of the poor or downtrodden. Women comprise 70% of those living below the poverty line. As a result, they are most likely to bear the heaviest burdens when natural disasters strike. At the same time, women are often overlooked as potential contributors to climate change solutions, and thus to the security of all human beings. Recognizing and mobilizing their skills and capacities as social force and channeling it to enhance efforts to protect their safety and that of their communities and dependants is a major task in any disaster reduction strategy. Women in developing countries are already on the front line of adapting to climate change, with increasing floods and droughts impacting upon their livelihoods. As pivotal managers of natural and environmental resources and key frontline implementers of development, women have the experience and knowledge to build the resilience of their communities to the intensifying natural hazards to come. But without full participation and involvement of women in decision-making and leadership, real community resilience to climate change and disasters simply cannot be achieved. There are many examples of women's informal community involvement in disaster reduction. For example in Uttarakhand Hilly area women have proved their might and power in restoring back their forest property as well as minimizing the effect of natural disasters. Both deforestation and the introduction of a money-based economy into the hills dramatically dislocated Uttarakhand village communities. Furthermore, natural disasters are seen to increase in intensity as a result of deforested watersheds and destabilized geology. In several more actions at places such as Amarsar, Chanchnidhar, Dungari, Paintoli, and Badhyargarh, hill women demonstrated their new found power as non-violent activists. In 1977, Bachni Devi, ironically the wife of a contractor, led village women to save forest. The resultant empowerment of women dismayed many men, yet others grew to accept the new state of affairs. Their spirit in defense of the land saved the day. Their spontaneous grassroots activism eventually culminated in the banning of all tree felling above 1000 meters in 1980. The aim of this paper is to discuss women empowerment as source of adaptation, and provide women with opportunities to control greater percentages of resources (including land) and services and to make independent decisions.

Numerical simulation of the devastating super cyclone Gonu (2007)

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KEYWORDS

supercyclone
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Orissa

ABSTRACT

The Super Cyclonic Storm Gonu 2007 was the strongest tropical cyclone on record in the Arabian Sea. Intense cyclones like Gonu have been extremely rare over the Arabian Sea, as most storms in this area tend to be small and dissipate quickly. The cyclone caused about $4.2 billion in damage (2007 USD), 50 deaths and 20,000 people affected in Oman, where the cyclone was considered the nations worst natural disaster. Gonu dropped heavy rainfall near the eastern coastline, reaching up to 610 mm (24 inches) which caused flooding and heavy damage. In Iran, the cyclone caused 28 deaths and $215 million in damage (2007 USD). Prediction of track and intensity of such devastating cyclones well in advance is necessary for disaster management purpose. In the present study numerical experiments are conducted to simulate the track and intensity of the super cyclone using Mesoscale Model MM5 with Two domains configuration (90–30 km resolution). Three experiments are conducted with variation in the cumulus parameterization schemes namely Grell (Gr), Betts–Miller (BM) and updated Kain–Fritsch (KF2). The forecast tracks indicate strong influence of cumulus parameterization schemes on the large scale steering flow. The observed movement of the storm is almost in the north-westward direction throughout the integration period. The track obtained from BM and KF2 experiments show northward movement initially and then recurved in north-eastward direction after 48 hours of integration. It appears that translational speed of the storm is slower in the case of BM and faster in case of KF2 compared to observation. Only Gr could simulate the track in the north-west direction which is close to the observed track (i.e. IMD). But all the three schemes underestimated the intensity. Further to study the sensitivity to the level of nesting two more experiments are conducted one with 3 domains configuration (90–30–10 km resolution) using Gr cumulus scheme and another with 4 domains configuration(90–30–10–3.3 km resolution) with no CPS on 3.3 km domain and Gr of rest three domains. The track seems to be less sensitive to the level of nesting but intensity forecast is improved with higher nesting level. The 4 domains configuration in which fourth domain with 3.3 km resolution is set to be moving with the storm gives the simulation of intensity of Gonu comparable with the observation. The results suggest that it may be possible to predict track, intensity and inner-core structures of devastating tropical cyclones with the help of high grid resolution and realistic model physics configuration.

Psychological support and mental health: Findings from cross-cultural research

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KEYWORDS

psychological support
resource losses
cross-cultural research
stress theory

ABSTRACT

'We know little about how culture shapes the psychological impact of disasters', writes disaster researcher Fran Norris. There is a 'critical need' for research to examine psychological support and mental health following natural disasters around the world. Further, '. . . too few studies exist to even begin to extrapolate general principles' (Norris, 2005). Do people in different regions experience similar distress symptoms? How might cultural and contextual factors such as geography influence preparation for and responses following disasters? This paper examines recent research conducted by the author that examines mental health and psychological support following disasters around the world, including the 2001 Gujarat, India earthquake, the 2004 Indian Ocean Tsunami, and the 2006 earthquake in Yogyakarta, Indonesia. The projects were guided by the conservation of resources stress theory (Hobfoll, 1989; 2002). The theory identifies four categories of resources: condition (e.g., marriage, employment, or other social roles), personal characteristic (e.g., age, knowledge, locus of control, self-esteem, skills), energy (e.g., money, insurance), and object (e.g., house, car, or other physical possessions). These resources are vital because they help people survive, provide meaning in their lives, and help people acquire or maintain other resources. Societal and cultural factors influence the type and quality of resources that people value and obtain. The theory predicts that psychological stress occurs when there is a *threat* of resource loss, *loss* of resources, or *lack of resource gain* following investment of resources (Hobfoll, 1989; 1998). The theory also predicts that resource gains following a stressful event may have positive effects on subsequent coping. For example, survivors may learn problem solving skills, develop an enhanced sense of self-efficacy, and have stronger bonds among family members (Linley & Joseph, 2004; Sattler, 2003; Tedeschi & Calhoun, 2004). Social support provided by friends and family also can play a vital role in helping people cope with tragedy (Kaniasty & Norris, 1995). Implications of the findings for disaster interventions are discussed.

Community participation and education — Community based disaster management and public awareness

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KEYWORDS

effectiveness
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disaster preparedness
residents
apartment building
awareness program

ABSTRACT

The role of communities and individual families in taking appropriate action to mitigate the impacts of disasters has been emphasized to the local government. The increased occurrence of small and medium scale disasters has resulted in the concept of Community Based Disaster Management which is a new approach to manage disasters through people's participation. The incidents took place in Bengaluru over recent years and Government of India's Disaster Risk Management Program and National Disaster Management Act influenced researcher to conduct 'A study to assess the effectiveness of awareness program on disaster preparedness among residents of selected apartment buildings in Bengaluru South'. Objective of the study was to assess the existing knowledge, the existing safety measures regarding disaster preparedness, develop and conduct an awareness program, compare pre test and post scores and find out the association between level of knowledge on disaster preparedness and demographic variables. A quasi-experimental study was conducted using pre test and post test with control group research design. Purposive sampling technique was used to select 200 residents from each group. Data was collected by using structured interview schedule and observational checklist. In this study majority of respondents were in the age group of 19–28, gender males, being graduates and professionally they were engineers. Majority of the respondents did not experience any disasters in their life and obtained information on disasters through different mass media. More than 60 percent of respondents did not have any training on disaster management. In the pre test 66 percent and 78 percent of respondents had moderate knowledge regarding disaster and disaster preparedness in experimental and control group respectively. In this study there were inadequate safety measures available at the apartments to prevent and face the disasters both in experimental and control group. The mean percentage score in pre test of control group was 60.05 percent against 59.15 percent of mean scores in experimental group. After awareness programme, in the post test the mean scores of experimental group was 77.8 percent. The mean difference in the pre-test and post-test scores in the experimental group was 18.65 percent which was statistically significant, however difference between pre-test and post-test in control group was 1.7 percent which was not statistically significant. Only in experimental group there was significant association between information and knowledge. Majority of the participants are between the age group of 19–28 years, graduates and professionally engineers. There were inadequate safety measures available at the apartments to prevent and face the disasters. In the post test score of experimental group there was 18.65 percent mean enhancement observed and there was significant increase in knowledge scores ($t = 2.715*, p < 0.05$). There was no significant change observed in control group. Hence awareness program on disaster preparedness was effective.

Disaster governance and survivability of victims: an Empirical analysis

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KEYWORDS

disaster governance
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CRZ

ABSTRACT

Disaster strikes the normal life and then governance. Often, disaster unearths the flaws in administrative structure. The affected community often wants the governance in its full capacity. Capacity does mean capability to demonstrate 'welfare mode' of state. In every disaster the survivors expect the unbiased and 'right based' mitigation approach, hence, post-disaster effects would have significant role in understand the nature of governance. The application or imposition of legal regulations and development policy are having multi faced recipients in disaster affected areas. Unlike other zones governance in post-disaster areas does not have a passive generality. Though it has receptive beneficiaries it does not mean that, they are pro-active. Often, the pre-disaster eco-social relations play as a control group in governance and the economic expectations as well. Hence the issue of rehabilitation hardly poses higher financial responsibility to the state. This paper discusses this issue in detail, by taking post-tsunami rehabilitation process in two villages of Kollam district of Kerala. The paper critically examines the nature of governance in the post-tsunami phase especially in connection with the implementation of Coastal Regulation Zone regime and non-governmental agencies involvement.

Informal sector water-utility management: Potential urban-slum upgradation policies in Bangladesh

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KEYWORDS

informal sector
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adaptable
upgradation policies

ABSTRACT

The unplanned water sector of slum settlements in many developing countries has an enormous backlog in the provision of reliable water supplies and sanitation services to its population, which is further exacerbated by the growing number of informal settlements. Development policy agendas are needed to be reshaped in ways that de-emphasize central state control and that shift responsibilities to local government, NGOS and the market. With some extensive literature review and using the outcomes of some studies on slum upgradation and its infrastructure development, this paper shows a range of practices and policies in accessing water and sanitation to urban slum settlements. The paper also summarizes the findings of the effectiveness of different policies and also discusses the difficulties and limitations of implementing government and private organizations initiations. It identifies the changes needed to make slum upgrading more effective and capable of reaching a much larger scale. It starts from the observation of supply and provision of water and sanitation of slum as well as various upgradation program and policies. This research is concluded outlining a conceptual statement of adaptable slum up gradation policies in the context of developing countries.

A study on the human and psychosocial factors contributing to industrial accidents

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KEYWORDS

unsafe action factors
psychosocial factors
personal factors

ABSTRACT

The human factor is very important for the achievement of the objectives of any organization without accidents. The human with his ability to feel, to think, to conceive and to plan is most valuable in the prevention of industrial accidents. The objective of this study is to know the causes of accidents due to human errors, and understand the importance of human behaviour, psychology and its role in preventing accidents.

Integration of public administrative infrastructure for effective disaster management

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KEYWORDS

disaster administration
irrigation
CBDM

ABSTRACT

This paper aims at examining the scope of utilizing existing public administrative infrastructure system for effective disaster management, and attempts to generate a dynamic model. It is necessary to classify disasters based on the area of occurrence and the type or genre. A landslide may occur in a remote, inaccessible hilly village terrain whereas tsunami hits along coastal areas where there would be roads. Season is another important aspect. For example, at the onset of southwest monsoon devastating floods cause damages to life and property. In the case of seasonal disasters the type of disasters that could happen can be anticipated to some extent, except the exact location and its timing. Time and day is another factor which has no bearing on disaster occurrence. There is no guarantee that on a Sunday or any other holiday a disaster will not occur. The speed of flow of information and its direction during disaster management needs to be cohesive which often is not. Presently disaster management is the responsibility solely of Revenue department with the support mainly from police and health departments depending upon the type of disaster. Many other major departments which can effectively contribute to this process are not made to participate for no reason. What is identified is that idling or underutilization of efficient, trained, skilled human resource in various departments happen in the case of disaster management. It is necessary to change this system for the better. The expertise and the organizational functioning method vary from department to department. The task of unifying these diverse but strong positive forces is herculean. Assigning or/and delegating powers to different ranks of officers in various departments would be necessary in disaster management. The organizational setup of different departments being different, directing a group of officers for a particular task demands more understanding of the public administration system. In addition to the Revenue Department which would be at the helm, other departments like PWD, IRRIGATION, AGRICULTURE, EDUCATION etc can be intertwined with this process. Use of static infrastructure like schools, community halls etc for rehabilitation, mobilizing the available vehicles attached to different departments etc for instance can impart speed and effectiveness to rescue operation. Decentralized governance has brought positive changes in management of activities at grassroot levels. The reach of panchayat raj institutions is a good attribute for utilizing their infrastructure capabilities in dealing with disaster management. The leadership qualities inherent with various political organizations functioning in the geographic limits of panchayat raj institutions can also be directed towards disaster management. Interlinking of modern communication technology and devices to the existing system demands a detailed and comprehensive idea of the machinery of different departments. This paper aims at evaluating the modus operandi presently resorted to by public administration in disaster management, and tries to identify the key requirements for effective and optimum utilization of the available infrastructure. Thus it attempts to generate a new dynamic model involving a matrix of departments. The infrastructure in this context means both human resource and the static, mobile and communication infrastructure. The geographic control space shall be taken as a revenue district.

Community-based disaster management and public awareness

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KEYWORDS

CBDM
NGO

ABSTRACT

The government of India constituted a 31 member committee headed by J C Pant in 1999 and the committee in its report identified 31 types of disasters under five categories such as water and climate related disasters, Geologically-related disasters, Chemical, Industrial and Nuclear related disasters, Accident related disasters and Biologically related disasters. When a hazard causes massive loss of life and property, it is referred as Disaster. It is a serious disruption of the functioning of a society causing widespread human, material or environmental losses. The loss is such widespread that the existing available local resources cannot fulfill the damage or losses caused by disaster. The paper consists of four sections and the first section deals with the introduction with back ground and rationale. The second section deals with the past experiences which reveal the fact that the pre and post disaster management strategies can be carried out effectively only with peoples participation and public awareness. Community based disaster management programs helps to prepare people and respond to disasters and recover from emergencies. The need for coordination between different government departments, local bodies, volunteers and NGOs with the people. The third section deals with community based mitigation measures and disaster preparedness. The definition and meaning of the term mitigation which applies to a wide range of activities and protection measures, from the *physical*, like constructing stronger buildings, to the *procedural*, like standard techniques for incorporating hazard assessment in land-use planning. The need to evolve a culture of preparedness among the people through public awareness is carefully discussed. The fourth section deals with strategies that can be adapted during and post disaster situations like rescue, rehabilitation and development with complete participation of community. Few experiences learned from the Gujarat earth quake and 2005 Tsunami in all the phases like rescue, relief, rehabilitation and development are explored to substantiate the argument.

Challenges and opportunities in managing humanitarian logistics inventories during mass emergencies

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KEYWORDS

logistics management
humanitarian support
relief
disaster management software

ABSTRACT

A major challenge before the administration during every disaster situation is the sustained management of logistics operation in accordance with the necessities of the affected community. Logistics support in response and relief phases puts thrust on the mobilisation of emergency services to maintain life as well as to socially support the affected communities by facilitating access to the basic needs of the people during and immediately after the disastrous event. The structure and functions of logistics management depends on the type, intensity, magnitude and impact of the disaster and the success of the entire relief operation may hinge upon the timely provision of supply and services. Acquisition and storage of relief materials to a central repository, its distribution to intermediate storage and further redistribution to relief camps requires adequate human resources with higher levels of management and quantitative skills. This paper reviews the challenges in humanitarian logistics distribution and the need for advanced technological developments in managing disaster response and logistics operations. The use of technological support in relief operations can make significant improvements in making smooth the complex process of information exchange and services management. Development of service-based software, its availability and promotion at different administrative and operational levels are discussed as part of the review to suggest best practices and user-friendly interfaces.

Objective approaches for landslide susceptibility zonation in western Himalaya

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KEYWORDS

LaSaRiZ
Himalayas
Landslide susceptibility

ABSTRACT

Availability of accurate and objective landslide susceptibility maps depicting zones defined on the basis of probability of occurrence of landslides is one of the critical inputs in assessing risk to property and lives in any mountainous region, particularly in the Himalayas. The aim of this study is to evaluate the potential of three objective approaches, namely, artificial neural network, fuzzy set theoretic and a neuro-fuzzy approach for landslide susceptibility zonation. The efficacy of these was examined in a landslide prone area in the Chamoli region of the Western Himalaya. An in-house software, with acronym as **La**ndslide **S**usceptibility **a**nd **Ri**sk **Z**onation (LaSaRiZ), was developed for landslide susceptibility zonation and risk assessment. Seven causative factors, namely, slope, slope aspect, relative relief, lithology, structural features, land use land cover, and drainage density, were considered. The results from the software indicate that LSZ map based on combined neural network and fuzzy approach performed exceedingly better than those produced from neural network black box approach and fuzzy relation based approaches. The landslide density values from this map clearly showed the close agreement of the susceptibility zones with actual field conditions.

Prediction of end of break/active phases of summer monsoon over India

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KEYWORDS

break monsoon
summer monsoon

ABSTRACT

India receives approximately 80% of annual rainfall during southwest monsoon and it is the key factor which affects the economy of the country. To know the interruption of monsoon by prolonged spells of sparse rainfall (break monsoon) during the mid-monsoon months of July and August over India is of vital importance. With this aim, present work has been carried out. The study brings out that after initiation of break (active) phase over India, total rainfall amount and its areal coverage over China increases (decreases). Time when it start decreasing (increasing), after attaining highest (lowest) values; marks the beginning of end of break (active) phase. The study certainly gives some clue about the end of break/active phase, although it does not give any signal of initiation of break/active phase. Departure in days of end of break/active phases from study and as reported is in the range −2 to +2 (except 3 cases out of fifteen) for breaks and 0 to −3 for active phases (except one case). Study points out that the highest rainfall over China remains more than 90 cm for break phases and the lowest rainfall remains less than 70 cm in active phases.

Women leadership in disaster management: A lesson learned from past

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KEYWORDS

gender
leadership
disaster risk reduction

ABSTRACT

The experience and impact of increasing frequency and intensity of floods, cyclones, droughts and salinity intrusion is gender neutral. But the question of adaptation and coping with respect to the changing nature of disasters are often remarked as gender biased. As because the rural women have far-reaching consequences on their human security issues, i.e. lives, livelihood, food and nutrition, physical and physiological protection, thereof women are viewed as a vulnerable group rather than active agents in risk reduction and adaptation. Over the years there has been a shift into the community's perception of the role of women. Evidence suggests that communities are now more ready to accept women leading their disaster risk reduction. Women are now involved in local disaster management committees formed within local government system. They also play a lead role in the NGO-led disaster committees at local level. However, the unaddressed specific vulnerabilities of women that form a barrier must be addressed before women can play a meaningful leadership role at the community level. Since, the role of these committees is limited in pre and post-disaster decision-making, women's economic contribution continues to be an overlooked area in economic planning as well as disaster assessment. As a result, they do not get a fair share from the post-disaster assistance. From this ground this paper explains some facts and thoughts of existing micro-level good practices those promote women leadership in disaster management.

Kerala fire & rescue services and its role in crisis management

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KEYWORDS

fire
rescue
crisis management

ABSTRACT

Kerala Fire and Rescue Services Department came into existence by the enactment of Kerala Fire Force Act 1962, (Act 20 of 1962) issued in Government Notification No.9018-E1-61/LAW dated 21.6.1962. It comes under State Home Department. It is a small department with a total staff strength less than 4000. The superintendence and control of the Kerala Fire and Rescue Services Department is vested with the Commandant General. Head Quarters of Kerala Fire & Rescue Services is at Thiruvananthapuram. For administrative convenience, the activities of the Department are put under the charge of five Divisional Officers with headquarters at Thiruvananthapuram, Kottayam, Ernakulam, Palakkad and Kozhikode. The Officer in charge of Fire and Rescue Stations in the district is Assistant Divisional Officer. Each Fire and Rescue Station comes under the direct charge of Station Officer. The primary duty of the Kerala Fire and Rescue Services Department is to save the life and to protect the properties from fire, accidents, and other calamities. As we all know service of Fire & Rescue Service is solicited in by lay man to highest officials in case of emergency. Service ranges from lift rescue to animal rescue, fire fighting in simple carbonaceous fire to complex aircraft fires and standby or escort duties during VVIP visits. Awareness creation is an area where Kerala Fire & Rescue service plays a key role. This Department organises training classes and mock drills, in association with government departments and non-governmental organizations. One major stake holder in this aspect is the Institute of Land and Disaster Management (ILDM), Thiruvananthapuram. Most valuable resource of any service is its personnel. Fire service is not an exception. But the personnel cannot perform effectively without necessary equipments. Fire fighting and rescue are collective work which requires disciplined human resource, trained to handle equipments. Training is imparted in handling casualties. The statistics regarding the life saved (human as well as animal) and the value of the property saved from fire during the past five years gives a clear picture about the relevance of this department. Human lives saved comes to 4493, animal lives saved 1390 and the value of the property saved about Rs.1131.15 crores. Fire & Rescue Service is not profit-oriented. Fire fighting and rescue operations are done free of coast. Free as well as paid ambulance service, pumping works, standby etc forms part of duty. There is a need for equipping the department with modern gadgets and techniques. In India terrorism has assumed serious dimensions after the Bombay attacks. This coupled with other factors like vertical development and growth of chemical industries has brought in new challenges to fire fighters and rescuers. This necessitates induction of new equipments for the purpose of fire fighting and rescue. Use of modern PPEs (Personal Protective Equipments) is an area of interest nowadays. In any crisis society at large in the immediate vicinity is the first responder. In disasters where the normal functioning of society itself collapses, the only agency for rendering help and support is Fire and Rescue Service. Its role in Kerala is crucial as it is the only organized emergency operational agency available in the state, capable of handling disasters in the changing scenario.

Numerical simulation of Severe cyclonic storm LAILA(2010): Sensitivity to initial condition & cumulus parameterization scheme

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KEYWORDS

cyclone
LAILA
cumulus parametrization

ABSTRACT

The cumulus processes play an important role in predicting the track, intensity and inner core structure of the tropical cyclones. Its adequate representation becomes one of the most challenging tasks in mesoscale numerical simulation and prediction. The present study explores the sensitivity of initial condition and cumulus processes on the numerical simulation of Severe cyclone LAILA (May 2010, maximum surface wind of 55kt and lowest central pressure of 986 hPa as per observation) during pre-monsoon season over Bay of Bengal. Mesoscale Model WRF with two two-way interactive nested domains at resolutions of 60 km, 20 km is used. Total 8 experiments are conducted using KF, BMJ, GD and new Grell as cumulus schemes and 00UTC of 16th May (observed state- no disturbance) & 00UTC of 17th May (observed state- low pressure area) as two different initial conditions. GFS data of $1^\circ \times 1^\circ$ degree resolution is used to initialize the model and to provide time dependent boundary conditions to the model. The model fields are verified against the best estimated track of cyclone provided by IMD. Even though the initial conditions are changed, GD & new Grell schemes are not able to produce the circulation. It is found that BMJ scheme produces less track error compared to KF scheme (KF shows northeastward movement). The track error is reduced when the initial conditions are supplied prior to formation of low. Intensity of the cyclone LAILA is found to be closer to the observations when integration is started on 16th May rather than 17th May. The simulated dynamic and thermodynamic structures (for both 16th May & 17th May) at the mature stage, in the present study are found to be comparable with the earlier reported theoretical and observational studies of cyclone. WRF model shows improved results when integration is started before any disturbance i.e. on 16th May.

Emergency planning in a hazardous chemical facility — A tool for effective disaster management

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KEYWORDS

chemical disasters
emergency planning
hydrogen sulphide

ABSTRACT

India is spearheading towards a rapid expansion of hazardous chemical industries be it, petrochemical, fertilizer, heavy chemicals, pesticides, pharmaceuticals etc which involves handling, storage, transportation and processing of chemicals. The safety in these activities is of prime concern. The consequences due to release/discharge of chemicals in any form (liquid, vapor, gas, smoke, dust or any combination of these) from the industry into the public domain attracts attention of media and cause panic to public. The Bhopal accident has changed the attitude of the government, plant managements and the administrative machinery from relief, rescue restoration and rehabilitation approach to prognostication, prevention, planning and preparedness with respect to hazardous industries. The facility under our study is a hazardous chemical processing industry involved in manufacture of heavy water, a prescribed substance used in the production of nuclear power in India. The hazards foreseen in this facility are of chemical nature. The stipulated safety criteria for the hazardous facility are ensured by strict regulatory controls. The process essentially contains production of a toxic, flammable and corrosive gas namely hydrogen sulphide gas through chemical double decomposition. The hydrogen sulphide gas is utilized for the bi-thermal chemical exchange with and enrichment of natural water to produce reactor grade heavy water. The inventory of the hydrogen sulphide gas in the facility would be maximum 400 tons. The facility stores, handles and processes the hydrogen sulphide gas at various stages of production process. The safety of the plant, public and the environment is given due consideration right from the siting stage of the facility and it is ensured during the progressive stages till regular operation. The safety features are engineered in the design for the safe operation of the facility. The probable emergency release scenarios of the hydrogen sulphide gas are identified. The various types of emergencies like Plant emergency (affecting plant areas only), on- site emergency (affecting the entire plant site) and Off-site emergency (affecting the areas in public domain) are envisaged. The emergency plans for mitigating the emergencies cited above are well laid out. The emergency planning process involves, zoning around the plant - exclusion zone (buffer area of about 1.6 km radius with greenery only) and sterilization zone (population controlled area of about 5 km), methods available for detecting leaks/gas releases, criteria for actions based on levels of gas detected through detectors placed at facility site, modes of declaration and termination of emergency through sirens, actions of facility personnel, identified responsible agencies of facility and local administration, action plans for all agencies, emergency resources (breathing apparatuses, emergency shelters, antidotes, communication systems, transport, etc). The preparedness for emergencies is ensured through periodic emergency exercises and mock drills involving facility and local administration officials. AERB as a regulator oversees the effectiveness and efficacy of the emergency plans and preparedness.

Disaster risk management in chemical industries — A case study

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KEYWORDS

chemical disasters
combination effect
ammonia

ABSTRACT

There have been considerable changes with respect to the frequency and intensities of natural hazards. The impact of these natural hazards on the chemical industries handling highly hazardous chemicals is significantly high and has the potential for '**combination accidents**' for example, triggering of chemical disaster, fire disaster etc. due to flood/earthquake disaster. The consequences of such disasters are very severe, both in terms of financial losses and safety of employees & public. In view of the above, the disaster management in hazardous chemical industries has become of significant importance. The paper highlights the consequences of floods and the precautions to be observed in case of flood emergency in a chemical industry with a case study of a flood incident at Ammonia based chemical plant at, Hazira, Surat. The safety issues that surfaced from the incident and the mitigation measures have been highlighted. Paper also suggests the application of 'Risk Assessment Techniques' for identifying hazards from such natural hazards triggering industrial hazards and incorporating mitigation measures in design stage, thereby aiding in formulating effective & efficient 'Disaster Management Plan'.

Resettlement and rehabilitation project implementation and its outcomes in Orissa: Case of TATA steel, Kalinganagar project and UNDP support for Government of Orissa

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KEYWORDS

R&R project in Orissa
participants' perceptions
local framework
Government policy

ABSTRACT

The study Resettlement and Rehabilitation project implementation outcomes concerns on the challenges of TATA Steel in Kalinganagar project and UNDP technical support for Government of Orissa in various R&R projects, while targeting to enhance livelihood options and quality of life of the rehabilitants. In 2008 data and information have been gathered to apprise the quality of life, market feasibility and policy implications at Sansailo Trijanga-I and II by three students of rural management, KIIT University and in 2009 one student has gathered data on the status of the R&R project intervention in Angul industrial belt and Jajpur in Orissa under the technical support of UNDP. Follow up fieldwork has been done by the author. Individual interview, stakeholders' opinion and case studies shed light on the outcome and challenges for the technical support team of UNDP, Tata Steel and Government of Orissa. Using insights drawing on field experience in R&R Orissa this study argues that consideration of active participation can contribute significantly to an understanding of rehabilitant's subjective perceptions and values towards the quality of life. This study emphasize that alternative livelihood options and its marketability and income will be possible by enabling people's active participation to design, implement and follow up appropriate business plan, housing and capacity building within a strategic community framework.

Challenges in managing e-waste in India

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KEYWORDS

extended producer responsibility (EPR)
e-waste
product take-back

ABSTRACT

The developing countries are facing a huge challenge in the management of electronic waste (e-waste) which are either internally generated or imported illegally as 'used' goods. E-waste contains hazardous constituents that negatively impact the environment and human health. In India, because of lack of adequate infrastructure to manage wastes safely, these wastes are buried, burnt in the open air or dumped into the surface water bodies. We should have in place legislation mandating electronic manufacturers and importers to take-back used electronic products at their end-of-life (EoL) based on the principle of extended producer responsibility (EPR). This paper gives an insight into various forms and the quantum of e-waste in the Indian scenario, the source and the circulation routes, the nature and the amount of toxic and valuable constituents of e-waste, potential pollution threat to environment, recycling methods, efficient management techniques for e-waste, awareness of people and legal requirements.

Response of international charter space and major disasters to major disasters

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Keywords

charter
disaster
flood
cyclone or hurricane
forest-fire
volcano
oil-spill

Abstract

Space based Disaster Management System has the distinct advantage of being unaffected by disasters on the ground and provides unbiased, synoptic and timely information on the nature and impact of the disasters. Indian Space Research Organization has developed several applications/programs and techniques with the space imagery to support disaster management. Further, ISRO is a signatory to the International charter 'Space and Major Disasters' along with space agencies of Canada (CSA), Europe (ESA, CNES, DMC), USA (USGS, NOAA), Argentina (CONAE), Japan (JAXA) and China (CNSA). Recently space agencies of Germany (DLR) and Brazil (INPE) have joined the Charter and are in the process of getting integrated into Charter operations. International charter 'Space and Major Disasters' is the maiden initiative of this kind, in which, space faring nations formally participate to pool their space and ground segment resources and deliver data in emergency situations. This paper brings out the objectives of International charter 'Space and Major Disasters' its operational organization, support mechanism and application for major disasters such as Flood, Cyclone or Hurricane, Forest-Fire, Volcano and Oil-spill. ISRO plays an active role in the charter functioning by sharing secretariat, Emergency on Call Officer and Project Manager Support services, and a brief account of ISRO's participation in the charter operations is provided. Charter has been active since 2000, providing useful service to humanity during major disasters all over the globe. Performance of the charter thus far, with illustrative case studies of selected charter activations is included. The kind of response the Charter received from the user agencies from all around the world once again established its significance and role for major disasters and its wider user base.

Role of NGOs in disaster management

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Keywords

NGO
Red Cross
accidents

Abstract

Disaster Management plays a vital role in India's policy frame work. The poor and under privileged are worst affected due to calamities as well as Disasters. Disaster needs a special attention during pre-disasters besides relief and rehabilitation phases. It is matter of sorrow that every year in India about 125000 persons die in road accidents and one third part of the nation's budget is being spent on accidents. In India, in every six minutes one person dies in Road accidents, over 17 million non-fatal injuries occur every year in work places which are serious enough to make people miss work and more than 45,000 workers suffer from fatal injuries on the job every year. In Haryana & Punjab about 4,500 & 4,000 persons respectively are dying in road accidents. There are so many other NGOs working in the area of Disaster Management. International Committee of Red Cross and National Societies of Red Cross are playing vital role with dedicated filed operation and resource backup. **Red Cross** provides its services in three phases Pre-Disaster, During Disaster and Post-Disaster. In the Pre-Disaster, awareness and training programmes are most important to reduce the risk of disaster and to work for rehabilitation and recovery in Post-Disaster phase and also to reduce the mortality rate during disaster. In this respect, it is important to know that St. John Ambulance (India) through its State & District Branches imparting First Aid training for the factory workers, Drivers, Police Personnels, Home Guards & Civil Defence Personnel, Students of Universities & Colleges as well as General Public. The details of the trained First Aiders always remain with the respective State/District Branches of the St. John Ambulance as well as National Headquarters. During Disaster so many persons die in absence of proper handling and timely help does not reach the affected/maimed persons. The services of the First Aiders can be utilized as they are the key persons to provide First Aid in a systematic way. They are trained to transport the casualties and in helping the medical staff. National Disaster Management Authority, Govt. of India should take the services of First Aiders through St. John Ambulance (India). It is also a need of time that First Aid must be a compulsory subject in schools, colleges & other professional Institutions and a Lecturers of First Aid should be appointed as Instructors through St. John Ambulance. During the Disaster phase, they can also provide technical support for safe construction, restore means of livelihood and can assist Government in monitoring Disaster Management Programmes. The First Aiders can also motivate the Local Resident Welfare Associations, Local Bodies, Panchayati Raj Institutions, Nehru Yuva Kendra Sangathan, National Service Schemes, Religious Bodies, Educational Institutions and these may be made trained for three phases of Disasters. It is also suggested that NDMA should prepare a clear guidelines that the First Aid should be compulsory for all the citizens of India so that immediate First Aid can be provided to the injured persons. The emphasize should be given on the vehicle holders either two, three or four vehicles as training of First Aid should be mandatory for these persons before issuing the Driving License like Drivers and Conductors of Transport Deptts. The St. John Ambulance should be the Nodal Agency for imparting & evaluation of the Training Programmes. Thus we can reduce the risk reduction like fatal of the road accidents.

Effectiveness of gender mainstreaming in disaster risk reduction

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Keywords

gender mainstreaming
disaster
risk reduction strategies

Abstract

Disasters are complex and quintessentially social events, reflecting not so much uncontrolled brute forces as the interaction of hazards and natural events with social structures and political communities. Women in developing countries are the most vulnerable sections of our society. Disasters affect women and men differently, and due to deep-seated gender inequalities, women are at greater risk of suffering from disasters (Enarson, Elaine and P. G. Dhar Chkrabarti, 2009). In view of the fact that women are more vulnerable in a disaster, their needs and concerns should be widely incorporated into risk reduction plans and strategies should be evolved from both perspectives of women as beneficiaries and decision makers. Commonly women are given least importance in risk reduction strategies. To promote the involvement of women, both as beneficiaries and decision makers, gender mainstreaming in disaster reduction policy making is considered an important element. Gender mainstreaming in disaster reduction refers to promoting awareness about gender equity and equality in disaster management. Thus, incorporation of gender analysis in disaster management and risk reduction helps in reducing the impact of disasters and thereby decreases the vulnerability of women contributing to sustainable development. Gender perspective should be included in the following components of risk assessment, early warning, information management, and education and training, etc. This paper aims to study the gender issues in disaster management and tries to look at the best practices of disaster management that had incorporated gender concerns in its application. This paper would further look at the challenges faced by women in disasters and suggest measures to achieve equal participation of women in decision making. Thus this paper would highlight the approaches that integrate gender perspective into disaster reduction strategies, thereby suggest changes in policies and practices that are necessary for mainstreaming gender in the Indian context.

Disaster risk communication over early warning technologies — A case study of coastal Kerala

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Keywords

early warning
disaster
cyclone

Abstract

Kerala has a long coastline with a length of 580 km which is vulnerable to various types of coastal hazards like storm surge, coastal flooding, sea erosion, tsunami, and cyclone. The impact of climate change can be manifested in these coastal hazards with the exposure sea level rise and is expected its intensity to be severe in the coastal area of the state in the coming years. It may add vulnerability of the states social and economic structure as coastal area of the Kerala which is one of the most densely populated regions in the country, with a population density of 2022 as against 819 for the state average (Census, 2001). Also most of the urban agglomerations are concentrated in the coastal belt including 5 municipal corporations and more than 75% state GDP contribute economic activities located in the coastal area of the state. Complex social, demographic, economical and environmental vulnerability and hazardous nature may turn coastal area of the state into a risky situation by increasing chances of various disasters. Disaster Risk Reduction and Management activities may reduce from the negative consequences of the occurrences of the various natural events in the coastal areas. Timely disaster communication through various early warning techniques plays a crucial role to reduce disaster risk in the coastal area. It can be done through timely prediction and dissemination of early warning to the vulnerable communities. Timely prediction of the occurrence of most coastal hazards is almost possible at this point of time with help of advanced science and techniques. Last mile connectivity methods including Very High Frequency Radio, Satellite based radios, DTH services; Incois Digital Board etc can be used to reduce exposure of the risk caused by the various hazards through timely disaster communication. In spite of these achievements in the field of information and communication technologies, still large numbers of vulnerable communities do not receive timely warning in a disaster situation. Thus early warning of communication or dissemination to the most vulnerable population is a serious challenging task in disaster risk reduction and management. Based on these experiences, Government of Kerala has established State-wide Early Warning System cum Communication Network with support of United Nations Development Programme under DRM Programme and Asian Development Bank under TEAP Programme. The system is Very High Frequency (VHF) technology, well known for Alternative communication at all types of needs in disaster point of view. This may be most accurate technology in the state through to disseminate warning to the vulnerable population in the hazard prone areas. Hence, Disaster communication over Early Warning Technologies can be a crucial part in a disaster risk management for the hazard prone areas of the coastal Kerala. This paper describes available opportunity to disseminating timely disaster communication over VHF technologies in a disaster situation to vulnerable coastal region of Kerala

Landslide prediction mapping using geoinformation techniques

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Keywords

landslide
geographic information system
remote sensing
disaster

Abstract

Landslides occur in a large variety of forms depending on the type and speed of movements, the material involved and the triggering mechanism. The study was undertaken in the Idukki district of Kerala characterized by highly undulating terrain with steep slopes. A spatial database was constructed from topographic maps, geology and land cover. Land cover was classified from IRS LISS III satellite imagery. Frequency ratio models were done for the preparation of landslide hazard zonation mapping and the field data compared statistically. The prepared landslide zonation map was overlaid by field landslide data and combined together to prepare landslide prediction map. The landslide susceptibility map classifies the area into four classes of landslide susceptible zones i.e., very high, high, moderate, low and very low. Based on the landslide zonation map landslide prediction map was prepared. The accuracy of landslide prediction map was verified by field investigation using GPS.

Multiple hazard mapping in block level using geoinformation technology

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Keywords

hazard
GIS
zonation map

Abstract

Natural hazards, the physical events of natural processes, can be considered as negative resources that alter/degrade the environment thereby affecting a large human population. The main purpose of multiple hazard maps is to gather together in one map the different hazards related information for each district to convey a composite picture of all the natural hazards. It also becomes a comprehensive analytical tool for assessing vulnerability and risk at the village level, an essential input to a planner. The present study develops different hazard zonation mapping using gis and remote sensing techniques. In this study village level information was collected based on field investigation and landslide zonation map, drought hazard map, fire hazard map, flood hazard map prepared. The study is of use in better preparedness and disaster management.

Drought hazard mapping in Chinnar Wildlife Sanctuary using GIS and remote sensing

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Keywords

drought
GIS
wildlife

Abstract

Remote sensing and geographic information system have significantly aided identification of drought vulnerable areas in the recent past. Drought is one of the natural disasters having an impact on both the economy and the society, with its long-standing problems. Drought by nature is a result of inter-related parameters. The study is based on the concept that the severity of the drought is a function of rainfall, hydrological and physical aspects of the landscape. In the present study a Geographic Information Systems (GIS) and remote sensing based tool for drought vulnerability assessment at a micro level has been developed. The present study identified drought prone areas of the Chinnar wildlife sanctuary in the Idukki district in Kerala. The Chinnar wildlife sanctuary falls in the rain shadow region of Kerala. The final map shows different zones of drought vulnerability ranging from low, medium, high and very high.

Gender analysis in disaster risk reduction through local planning and budgeting process in Bantul regency, DIY Province, Indonesia

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KEYWORDS

gender
disaster risk reduction
planning budgeting process

ABSTRACT

Disasters that have been happened in Indonesia has given the hard earned lesson that disaster risk reduction must be a basic ingredient in the government planning policy. A key factor in disaster risk reduction is ensuring that gender analysis is integrated. Related to the local planning and budgeting process, it is important to analyse the impact and do a vulnerability analysis, stakeholder relation analysis, and finally to have women in positions of decision making in for local planning and budgeting. As the most solid and concrete policy product of the executive and the legislative, the budget can increase or even sustain gender bias. A gender sensitive local planning and budgeting process that uses disaster risk reduction perspective will encourage gender welfare and gender equity in development process. The problems related to local planning and the budgeting process are the limited participation in budgeting, especially of women and other gender minority, budget policy that does not consider the prevalent gender bias. That makes the argument for a budget arrangement that uses a gender-neutral approach. The most important thing is that disasters directly impact women. Moreover, women's participation in the process of policymaking, particularly budget, can be a medium for women to be involved in the development, and finally they are encouraged to struggle for safeguarding interest. In fact, the long-term impact of disasters on nutritional status, health status, clean water crisis is a very real influence on women, children, the elderly and the disabled. The process of disaster risk reduction is limited by not having time devoted to elaborating the perceived impact of different gender groups. Through the stages of local planning and budgeting process with disaster risk reduction perspective and gender responsiveness, the impact of disasters may not increase the existing gender inequalities. The questions that need answering are:

(1) How the local planning and budgeting process are arranged based on disaster risk reduction perspective and gender mainstreaming approach, especially in the study area, viz., Bantul regency

(2) How the local planning and budgeting process is arranged based on gender mainstreaming approach from the planning phase, validation phase, and accountability phase in Bantul regency, DIY province

(3) How the local planning and budgeting process, is arranged based on benefit analysis especially for women and the gender minority, whether it is an increase or a decrease or no effect for gender equity, vulnerability towards disasters, disaster impact analysis etc based on target MDG's.

A preliminary assessment on the potential risk of malnutrition in a selected tribal community of Periyar Tiger Reserve, Kerala

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KEYWORDS

Malnutrition
disasters
tribal community
Kerala
rural development
ICDS

ABSTRACT

Malnutrition, illness and extreme poverty are recurrently becoming the major reasons for the child mortality with an estimate of 3.5 to 5 million annual deaths across the world. The highly alarming situation rises beyond the death toll of natural disasters. Hence malnutrition need to be considered as a silent disaster spreading across communities and war foot based strategies and policies are required along with strong political will to implement the solutions. Malnutrition in India continues to be at high level in many of the states. In response to combat malnutrition related eventualities, central government in India and its state governments have begun to focus on this issue through various plans and schemes. The primary objective is tending to be the improvements in the health status of the suffering people, particularly women and children. Integrated Child Development Service, Mid-Day meal Scheme, National Rural Health mission etc. are some of the important central government schemes to improve the nutritional and health status of vulnerable population in the rural and urban areas. Though the hunger and malnutrition in Kerala is not as severe as in various other states in India, cases of malnutrition are reported from remote pockets of hilly terrains and coastal belts of Kerala where the tribal communities are inhabited and where the governmental system usually had failed to reach. An investigation has been made in search of malnourished communities in the tribal habitats of Idukki and Pathanamthitta districts of Kerala. The paper discusses in details the present status of the tribal community along with their traditional and historical cultural uniqueness. The preliminary assessment shows that the identified tribal group is severely malnourished in several ways and the people especially children below five years in age are suffering in an acute way. Immediate relief and sustained living packages are indeed very crucial for the specified community.

Flood frequency analysis of Rohini river in east Uttar Pradesh

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KEYWORDS

ARNO model
flood frequencies
Rohini river
hydrological models
climate change
statistical downscaling

ABSTRACT

Floods are most common of natural disasters that cause a lot of damage to life and property of human society. A reliable estimation of magnitude and frequency of occurrence of such extreme events is of great significance in minimizing damages by facilitating proper planning and design of civil engineering structures such as bridges, barrages and dams. In the present study, the L-moments have been used for flood frequency modelling of Rohini River Rohini, which is an important river of East Uttar Pradesh has been selected for this study. This river basin originating from Chure Hills in Nepal flow down to India and joins rive Rapti in Gorakhpur is dependent on rainfall and responds rapidly to rainfall events due to which recurring and destructing floods are quite common every year in the main river as well as in tributaries. Though there are a number of flood control measures implemented in the catchment, the river overflows every season, creating damages and loss to lives and property. Detailed topographic and physiographic information together with hydro-meteorological data are very much essential to achieve effective disaster risk reduction and to enable preparedness for minimising the flood risk. Due to fewer hydro-meteorological data availability and sparse network of rainfall and streamflow stations assessment of runoff and flood volumes are possible only with hydrological models. In this paper we describe a new approach of flood frequency analysis of model-simulated flows which is based on rainfall-runoff modelling using historical rainfall data of the basin and the ARNO model to simulate the flow volumes. In order to achieve the task, initially the ARNO model was calibrated using the available data for the period 1976–2006. The results showed a good agreement between observed and predicted flows (coefficient of determination 0.85, RMSE-83.89 and MAE 54.79). Further, the calibrated model was used to simulate the flows for a period of 2007–2009 with projected rainfall and evaporation from climate change scenario A2 and B1 for region (climate change CGCM3 model, the projected data of rainfall and temperature were obtained International, New Delhi). The simulated annual peak runoff values were then subjected to estimate flood frequencies for various return periods using the L-moments method. Though the model has limitation to calibration in ungauged catchments, when long term records of rainfall and runoff are available, model can be calibrated and used for both simulation and real time flood forecasting. Estimated flood quantities for various return periods from 2–200 years varied from 420–1882 during historic period and between 1019–2313 cumecs for the projected period which shows that there are possibilities for flood volumes to increase in the coming years due to induced climate change. The result presented here gives an idea about the possible flood quantities under the prevailing conditions of the river, such as embankment and river training. The different return period values may of use in planning the flood mitigation activities. The methods used in this study are simple and can be used when limited data are available.

Application of Artificial Intelligence (AI) in disaster mitigation and management

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KEYWORDS

artificial intelligence
DMM
ANN
LSSVM

ABSTRACT

Throughout our history, humans have had to deal with different type of disasters (earthquake, landslide, flood, tsunami, cyclone, etc). Disasters have exacted a high toll in terms of lives and property. Because of their scale and magnitude, governments attempt to manage the impact of these disasters or at least mitigate their disastrous consequences. Disaster mitigation is the process of designing and implementing procedures for reducing the risk associated with the occurrence of a disaster, typically by reducing either the likelihood or the impact of a potential disaster event (Ridge and United States Dept. of Homeland Security, 2004). Disaster Mitigation and Managements such as condition assessment, performance prediction, needs analysis, prioritization, and warning system are often based on data that is uncertain, ambiguous, and incomplete and incorporate judgment and expert opinion. Artificial Intelligence (AI) techniques are particularly appropriate to support these types of decisions because these techniques are very efficient at handling imprecise, uncertain, ambiguous, incomplete, and subjective data. The most used AI constituents, Artificial Neural Network (ANN), Fuzzy system (FS), Genetic Algorithm (GA), Support Vector Machine (SVM), Relevance Vector Machine (RVM), Least Square Support Vector Machine (LSSVM), and Genetic Programming (GP). There are several disaster mitigation and management characteristics that make the use AI approach particularly attractive. These characteristics are: (1) available information may be imprecise, uncertain, ambiguous, subjective (expert opinion), and incomplete, (2) disaster management decisions, such as needs analysis, often involve sophisticated inference rules and require a great deal of expert knowledge. Because of these reasons, the disaster mitigation and management field has been a fertile ground for the application of AI techniques as demonstrated by the many applications that have been reported in the literature.

Epidemiology of stampedes: the case of Sabarimala pilgrimage in Kerala, India

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Keywords

Stampede
Sabarimala
crowd behaviour
pilgrimage

Abstract

Kerala is host to two among the world's largest religious congregations. Amongst the two, the congregation of women on the festival day of Pongala is recognized as the largest gathering of women at a single locality in the world (approximately 2 million every year). The second location, Sabarimala, witnesses a very large annual pilgrimage with an estimated 45–50 million devotees visiting every year. The former has been free of disasters so far in its history, but the latter has been marred by two stampede incidents, one in January 1999 (53 deaths) and the other on 14 January 2011 (104 deaths). The Sabarimala temple is located about 1500 metres above mean sea level within the dense tropical forests of the Western Ghats mountain ranges within the protected Periyar Tiger Reserve and is opened up to pilgrims for a few days in a year. Burkle and Hsu (2010) has pointed out that often there is very little research on the epidemiology of stampede events and the demographic characteristics of the stampede victims. No women died in these stampedes (being a male-only pilgrim site). The unique features of the temple and the rituals associated with it has to a certain extend contributed to the tragedy. The temple is open for worship only for about a month every year, between December and January. Though this temple has been popular with devotees since the late 19th century, it was after 1998 that the number of pilgrims increased. Even though it is located in Kerala, more than 70% of the pilgrims come from the other states of India like Tamil Nadu, Karnataka and Andhra Pradesh. People from Kerala generally make short and quick visits to the temple, unlike others who make it a grant finale to a year of work and worship. The underlying sociological and demographic implications need examination. Amongst the 104 deaths in this stampede only five were from Kerala, 99 being from other states. Thus through a study of the stampede it is not just crowd behaviour that can possibly be modelled but also varying behaviour of populations to matters of belief, penance and maybe altered perceptions of the threats and risks involved. The avarice of local transporters and caterers in scalping the out-of-state pilgrims of their money was at the root of the stampede. Money, faith, nonchalance, and apathy, corrupt practices, and inability to discern risks all added up, in the events that culminated in the stampede. Most deaths were by the lungs and liver getting ruptured by broken ribs, with pressure exerted mostly not due to front to back thrust, but by people trampling over fallen bodies. The stampede was on hill slope some distance from the temple, where some 100,000 pilgrims had gathered on the hill top for a view of a so-called celestial lighting phenomenon that culminates the season of pilgrimage, and the temple shuts its doors till the next season. Naturally, being a forest, but with savanna type vegetation of grasses, there was just a small trekking path of about 3 m width. The stampede lasted less than eight minutes, from 20:25, on this path. No crowd control measures were in place. One possible solution to the crowd situation is to open the temple up for longer periods, and spread over a year, but these changes have cultural and religious implications. With increasing pilgrim populations, urbanization of the forests will be accelerated. Crowd control through restricted trekking paths, predetermined appointments for temple visit, base station with facilities for pilgrims to rest before they begin their trek based on their predetermined time slot of visit, and more participation of police and other administartive forces from the the neighbouring states who can speak the language of the majority of the pilgrims maybe some remedial measures. An integrated study across disciplines is essentail to bring out the crowd dynamics of this complex pilgrim spot, and such a study would also bring to light the interactions between religion, belief, politics, money, power, gender and language.

Disaster risk reduction and climate change

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Keywords

climate change
adaptation
DRR

Abstract

Anomalous precipitation, extreme weather evens and dry weather are being caused by anthropogenic climate change, as reported. IPCC has included so in its most recent report. Heat waves in Europe, increasing intensity and frequency of hurricanes, in the Atlantic, Pacific and Indian ocean regions, droughts in Africa, and southern parts and flooding as weather-related disasters, due to climate change impacts. These are affecting human population and livelihoods destroying property, lives and crops in many parts of the world particularly in vulnerable areas. Natural hazards from climate related changes are increasingly affecting developing parts of the world causing an adverse import on the process of development. The World Conference on Disaster Reduction calls for international cooperation to tackle this issue, since both developed and developing countries are a rick from hazards turning into disasters.

The profiles of natural hazards and disaster are changing due to changes in climate, altering the underlying environmental health and demographic risks while introducing new threats. There is a need and opportunity to reduce current and future vulnerabilities by building an and expanding disaster risk management efforts, in addition to and as part of climate change mitigation and adaptation protocols and plans.

Coastal hazards: Are we doing enough?

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Keywords

coastal hazards
sea-level rise
preparedness

Abstract

All across the world, the coastal land is home to mega population centers and scores of smaller cities and towns, which are wide open to and practically defenseless against the most destructive forces of nature like, severe-storm-related hazards, hydrologic floods, beach erosion and tsunamis. Added to this, several coastal communities face massive threats to livability and property primarily contributed by anthropogenic actions, like green house warming induced sea level rise, land subsidence due to mining or withdrawal of fluids from subsurface, pollution of coastal waters, oil spills and sea water ingress into coastal aquifers. That eleven of the fifteen largest cities of the world are located near the coasts of seas or estuaries is an indicator of the vulnerabilities. ăIn India, state capitals of some littoral states (for e.g., Mumbai of Maharashtra, Panaji of Goa, Trivandrum of Kerala, Chennai of Tamil Nadu and Bhubaneswar of Orissa) are in the coastal land. Conterminous India, with its pretty long shoreline of 5700 km, (Kerala sharing roughly 10%) and being closer to the equator, has its own share of worries arising out of natural hazards. Vulnerability of the population in the coastal land to hazards is directly linked to the morphology of the coastal land (elevation), population density and proximity of population pockets to the shoreline (proximity), or in other words to placing property and lives ăinappropriate areas. Human populations, cities, ports, and wetlands in low-lying coastal areas, will be affected by inundation, erosion and salination as a result of a climate change induced sea level rise between 0.3 and 0.9 m say by the end of this century, due to rising greenhouse gas emissions. ăA chief consequence of SLR is coastal erosion and loss of land and contamination of coastal fresh water aquifers. Consequences of a global sea level rise would be spatially non-uniform because of local or regional vertical crustal 'movements', differential resistance of shoreline to erosion, varying wave climates, and changing long shore currents. Intensive development and investment in the coastal land make them vulnerable at the time of erosion, hydrologic storms, storm surges or tsunamis. Vulnerabilities due to Coastal hazards are preventable either by structural interventions or simply by staying away or relocating in the backshore of zones potential threats. While the structures reflect the wave energy, the natural vegetation helps to absorb the same. Options are two sided, like, do nothing and get out of the area or adapt and accommodate. One of the management responses is retreat from the affected area and move toward the backshore. Secondly by building elevated houses on stilts, the affected communities could be saved. Third option is basically preparedness like education and creating awareness and placing early detection, warning and communication and emergency evacuation systems. Preparedness on the part of local and state or national governments in warding off the damages of hazards is fundamental to it. The recently launched program by the MoEF, GoI for mapping the vulnerable coastal areas of the Indian littoral states and creation of an institute in Chennai for research on coastal hazards are right initiatives. But the states contribution in this regard is not yet crystallized fully.

Drought vulnerability assessment and mapping: Approaches and methods using geospatial tools

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Keywords

drought
risk
vulnerability
SPI
VCI
GIS
multi-criteria analysis
HDI
yield

Abstract

Paradigm shift in drought management world over from response and relief centric towards preparedness, prevention and mitigation centric has increased attention and urgency to undertake research on assessment and mapping of vulnerability. The study reported here demonstrated a methodology to assess and map agricultural drought vulnerability during main kharif crop season and compare its intra-seasonal variations in the Rajasthan state of India. A conceptual model of vulnerability based on variables of exposure, sensitivity and adaptive capacity was adopted and spatial datasets of key factors contributing to vulnerability were generated using remote sensing and GIS. Hazard exposure was based on frequency and intensity of gridded Standardised Precipitation Index (SPI). Agricultural sensitivity was based on soil water holding capacity as well as frequency and intensity of NDVI derived Trend Adjusted Vegetation Condition Index (VCI_{Tadj}). Percent irrigated area was used as a measure of adaptive capacity. Composite agricultural drought vulnerability was derived separately for early, mid, late and whole kharif seasons by composting rating of factors using linear weighting scheme and pairwise comparison of Multi-Criteria-Evaluation. The regions showing very low to extreme rating of hazard exposure, drought sensitivity and agricultural vulnerability were identified at all four time scales and their statistics calculated. The results indicate that high to extreme vulnerability occurs in more that 50 percent of net sown area in the state and such areas mostly occur in western, central and southern parts. The higher vulnerability is on account of non-irrigated croplands, moderate to low water holding capacity of sandy soils, resulting in higher sensitivity and located in regions with high probability of rainfall deficiency. The mid and late season vulnerability has been found to be much higher than during early and whole season. Significant negative correlation of agricultural vulnerability rating with crop productivity and socio-economic indicator of Human Development Index (HDI) proves the general soundness of methodology demonstrated in this study. The study on drought vulnerability mapping is expected to lead to better preparedness and mitigation oriented management in Rajasthan State.

An emergency essential service module for natural disasters

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KEYWORDS

natural hazard
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emergency essential service module
cyclone
coastal areas
local material and technology

ABSTRACT

Bangladesh is most vulnerable to several natural disasters and every year natural calamities upset people's lives in some part of the country. The major disasters concerned here are the occurrences of flood, cyclone and storm surge, flash flood, drought, tornado, riverbank erosion, and landslide. The geographical setting of Bangladesh makes the country vulnerable to natural disasters. The mountains and hills bordering almost three-fourths of the country, along with the funnel shaped Bay of Bengal in the south, have made the country a meeting place of life-giving monsoon rains, but also make it subjected to the catastrophic ravages of natural disasters. Its physiographic and river morphology also contribute to recurring disasters. Abnormal rainfall and earthquakes in the adjacent Himalayan range add to the disaster situation. Effects of *El-Nino-Southern* Oscillation (ENSO) and the apprehended climatic change have a great impact on the overall future disaster scenarios. Most of the coastal areas of the world are at risk from natural hazards resulting from geological and meteorological disturbances. In Bangladesh, coastal areas are ecologically sensitive and climatically vulnerable because of the continuous process of erosion and accretion, which needs to be protected for natural vegetative growth and a forestation. It also contains one of the largest (5000 sq. km) mangrove forests in the world. The area covers over 6.8 million of households in 147 *Upazila* (Sub-district) along the coastal belt, which considered as risk prone. This Research project deals with one such measure that is in need of attention — that can directly help environmental refugees as an instantaneous response addressing their need for help. An Emergency essential Service module is proposed to cope with the immediate aftermaths of natural disasters when vast multitude of population is faced with homelessness having neither food, nor a roof over their heads. The module will offer shelter to distribute emergency services that are essential for theses environmental refugees for survival, viz. facilities like first aid, medical unit, unit for dry food/goods storage, relief distribution areas, etc. Of necessity such a module should be built with local material and technology — buildable in a very short time with minimum cost. Conceptually the module should be an immediate solution that can be built overnight when needed and dismantled and stowed away when the need disappears — to be available for reuse once again when disaster strikes again. The paper will focus a specific case study cyclone prone site where the research project will design a module with above mentioned services and techniques.

Landslide susceptibility mapping of the Munnar region, Southern India using remote sensing and GRASS GIS

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KEYWORDS

GIS
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susceptibility
GRASS
Munnar

ABSTRACT

Landslides are one of the natural hazards that affect at least 15% of land area of India exceeding 0.49 million sq km. Landslides have had disastrous consequences and in 2005, over 500 lives were lost in India due to landslides. Landslides are common in the Himalayas and in the Southern India, especially in the Nilgiris and Kodaikanal hill ranges. The aim of this study is to analyze the factors controlling the landslides in the Munnar region of southern India and prepare a landslide susceptibility map using Remote Sensing and GRASS (Geographic Resources Analysis Support System) GIS as the tools. The study area, known for its tea plantations tourism, has been experiencing landslides recently. Rainfall, geology, morphology, physical and human factors can be considered as triggering factors. The other causes which include slope, landuse, vegetation density, availability of unconsolidated sliding material etc. have to be mapped and studied in detail to arrive at an accurate landslide hazard zonation map of this area. This paper aims to study the satellite images, rainfall data and other collateral data of Munnar region and decipher the causative factors that are active in the region for the occurrence of landslides. Proper rank and weights for factors influencing landslides were assigned for the themes. Overlay analysis using GRASS GIS software resulted in a map showing the severity of landslide in as high, medium and low in the study area. Thus, it is seen that remote sensing and GRASS GIS are well suited for identifying landslide prone areas.

Disasters: A sociological perspective

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Keywords

suicide
disaster
perspective
conceptual typology
social dimension

Abstract

The paper is comprised of *four* sections and the following are highlighted in the paper: The *first* section, consisting of Introduction, Historical background of the term disaster, and social dimensions of disasters. In this section of the paper, how disasters are defined, conceptualized, perceived sociologically will be discussed. This will be followed by the explanation of disasters and its impacts from sociological point of view. In a more theoretical way the social dimensions of disasters from sociological standpoint will also be discussed. This paper stresses the significant contributions to the conceptual typology of sociological disaster research. The *second* section addresses the Perspective: the argument is developed in such a way that it will enable us to understand, analyse and interpret the causes and consequences of disasters from sociological point of view. Besides, few studies of hazards and disasters have been reviewed from a sociological perspective. In this section of the paper an attempt has been made to explore what research has been done to address disasters and to what extent disasters are highlighted and analysed from the sociological perspective. The *third* section discusses Durkheim's sociological interpretations of Suicide including a brief discussion of social dimensions of suicide, the four types of suicide, methodological aspects of the sociological study of suicide, and to discuss suicide from social aspects. Also it is attempted to stress the significance of the study of suicide as a subject; and the need of up-to-date statistics of suicide; and what strategies to adopt for the early intervention and prevention of suicide. In the course of discussion, the paper seeks to explore the increasing and changing factors leading to suicides among youths in the contemporary situations. The *fourth* and last section ends with concluding remarks. In this paper it is stressed that social dimensions of disasters or, to be more precise, sociological approaches to disaster research must be given serious consideration. By drawing upon social theory and empirical research, policy makers can enrich their understanding of disaster risk, and therefore, also develop more effective and equitable mitigation and response strategies (in reducing immediate and future risks in the context of disasters) in future.

Critical reflections on Post disaster recovery and reconstruction in Andaman & Nicobar Islands, India

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Keywords

disaster
A&N administration
island and vulnerable groups

Abstract

The article examines the post-disaster recovery and reconstruction activities to the major and minor disasters which are frequently disturbing the life of the islanders. The paper is focusing on the various actions taken by the A&N Administration as well as the social and developmental organizations, extracting lessons learned and identifying specific implications towards the episode. The sudden occurrence of the frequent earthquake distracts the normal life of the islanders and it hit in almost all part of the areas of the Andaman including North, Middle and Southern parts. The paper is at first attempt to review the recovery and reconstruction activities of the various stakeholders in relation with the December 2004 tsunami and earthquakes. Later the author point out the frequent incidence of the various disasters especially earthquake, flood and climate related disasters. Lessons that have been learned from the post-disaster response are summarized, including: (a) lessons that apply primarily to the relief phase; (b) lessons for rehabilitation and reconstruction; (c) do's and don'ts; (d) island specific observations. (e) finally the impact and the long term implications of the intervention on the livelihood of the islanders in the post disaster response period. The author describes his experience and tries to analyze the role of administration and the various other stakeholders in the areas of disaster recovery and reconstruction. The author finally suggested the unavoidable elements needs to be incorporated in the post disaster response phase.

Community-based adaptation to coastal hazards: A scoping study among traditional fishing communities in Kerala, India

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KEYWORDS

coastal hazards
adaptation
sustainable livelihoods
fisheries

ABSTRACT

Traditional fishing communities in India are vulnerable to different types of coastal hazards and related livelihood uncertainties. Moreover, with challenges such as global warming and climate change, these coastal communities have become more susceptible to the vagaries of nature. Taking the case of coastal fishing communities in the southern districts of Kerala, India, this paper explores the adaptation strategies that emerge in the context of environmental changes and coastal hazards. Firstly, this paper examines the nature and impact of coastal hazards on sustainable livelihoods. Secondly, it analyses the nature and consequences of adaptation strategies followed by different stakeholders in coastal resource management with respect to environmental degradation and coastal hazards. The findings of this study show that stakeholders such as state authorities mostly resort to technological adaptation such as the construction of seawalls, breakwaters, and groins. However, these costly interventions seldom take into consideration the livelihood dependencies of traditional fisherfolk on their coastal resources. This paper also shows that such interventions enhance the vulnerability of coastal communities to natural hazards. Territorialisation of fisheries, resource use conflicts, and migration are other visible outcomes of such interventions. This study is qualitative in nature. Data was collected using in-depth interviews. Data was collected from traditional fisherfolk, elected representatives of local governing bodies, and officials from the state departments. The findings of this paper will significantly contribute to existing debates on community-based disaster risk reduction and adaptation strategies.

A study on the role of self help groups in communicating risk and risk management strategies for community resilience and security in Tamilnadu

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KEYWORDS

natural disasters
communication
technology
radio
village information centres

ABSTRACT

Natural Disasters like Cyclone, Flood and Tsunami have been affecting the coastal communities for a long time. The prime reason behind this impact is the lack of last mile communications. In a disaster situation, timely warnings allow people to take actions that save lives, reduce damage to property and minimize human suffering. To facilitate an effective warning system, there is a major need for better coordination among the early warning providers as well as those handling logistics and raising awareness about disaster preparedness, security and management. There are many new communication technologies that allow warning providers not only to reach the people at risk but also to personalize their warning message to a particular situation. Opportunities are available right now to significantly reduce loss of life and properties if disaster warning systems can be improved. In this study, the researcher analyzes how different communication strategies play an important role in disseminating information among the people during emergencies using survey and interviews. This paper also looks into the effective role of self help group women in communicating risk management strategies to coastal community in the Tamil Nadu state of India.

Land use planning: Technique to reduce vulnerability to flood in coastal village — A case study of Kaikhali village in South 24 Parganas, West Bengal, India

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Keywords

land use planning
village as planning unit
social & physical vulnerability
flood management
GIS & RS

Abstract

Socio-economic vulnerability to disaster is not in isolation with physical vulnerability. Socio-economic conditions largely depend upon how activities are spread over the land i.e. land use. In an urban setting it is largely based on anthropogenic decisions and choices but in a rural setting it is more of the natural characteristics viz. soil, topography, geomorphology, vegetation cover that decides the use of the land viz. agriculture, fishery, plantation, forestry, fishing etc. Hence, to reduce socio economic losses due to flood, it is essential to plan physical distribution of activities concordant to the natural ecosystem (coastal in this study) of an area so as to sustain livelihood even after a natural disaster viz. flood. This paper will focus on land use/land cover conversion, functionally & topographically suitable location for flood shelter and improved transportation network to enhance the economy. This study had been completed using Geographic Information System (GIS) and Remote Sensing (RS) techniques.