Course Brochure

Five Day National Level Training Programme on “Flood & Drought Risk Management” (21-25 January, 2019) at NIH Roorkee, (Uttarakhand)

ABOUT NIDM

The National Institute of Disaster Management (NIDM), Ministry of Home Affairs, Government of India is a centre of excellence and learning in the field of disaster management. It is a premier resource institution for human resource development, training, capacity building, applied research, implementation and dissemination of information and theoretical knowledge to case study based practitioners approach for holistic disaster management. The institute works towards the effective application of disaster risk mitigation and management in India as well as in the region by providing technical assistance for capacity building and developing disaster management systems and institutional framework in the sector. Some of the key areas in which the institute is involved are:

- ✓ **Training:** Training programmes, training workshops, and training of trainers for officials at the national, state and district levels to prepare them to tackle natural disasters.
- ✓ **Research:** Issues, concerns and lacunae in management of disasters, Lessons learnt from past disasters and best practices in Disaster Management.
- ✓ **Documentation:** Disaster events, Impact of disasters, Situational analysis of relief and response measures, creation of database through primary surveys and secondary sources, preparation of brochures, pamphlets, posters, films etc.

ABOUT NIH ROORKEE

National Institute of Hydrology (NIH) is a premier Institute in the area of hydrology and water resources in the country under Ministry of Water Resources, River Development & Ganga Rejuvenation, Govt. of India. The Institute was established in 1978 with the main objective of undertaking, aiding, promoting and coordinating systematic and scientific work in all aspects of hydrology. The Institute has its Headquarters at Roorkee (Uttarakhand), four regional centres at Belgaum, Jammu, Kakinada and Bhopal and two centres for Flood Management Studies at Guwahati and Patna. The Institute is well equipped to carry out computer, laboratory & field oriented studies.

About the Course

Logistics

Programme Venue and Duration:
The programme will be organized at NIH Roorkee. The training programme will start on Monday, January 21, 2019 and will conclude on Friday January 25, 2019.

Target Group: Senior and middle level officers/trainers from state government departments of Urban development, Irrigation & Flood Control, Agriculture, Animal Husbandry, Revenue, Health, PHED, PWD, Road & Bridges, Food & Civil Supplies, Environment & Forests, Police, Civil Defence, Municipal Corporations, Panchayati Raj, Rural Development and Fire & Emergency Services, etc.

Course Fee: The Registration/nomination is free for the participants nominated by establishments/Departments/Institutes under the States/ UTs of India.

Boarding & Lodging: The boarding and lodging arrangements for the confirmed participants would be arranged by NIH Roorkee whereas the travel cost of participants from their headquarters to NIH Roorkee would be borne by their own sponsoring / nominating organization/Department.

Academic

Objectives: The key objectives are as follows:

- To provide the participants about the concepts of disaster management and an overview on approaches & pathways of climate change scenario in flood & drought in India
- To enhance understanding concerning the nature, extent of the threats and the value of counter measures to combat the adverse impact of floods and droughts
- To give an overview on various structural and non-structural measures for preparedness and mitigation during flood & drought
- To provide an overview on the role of weather information and forecasts, Early Warning System and criteria for Flood & Drought
- To develop administrative capabilities to plan and implement disaster resilience for a safe national sustainable development

Course Contents: The contents of the course would cover the following aspects, to achieve the objectives:

- Basic Concepts of Disaster Management and Disaster Risk Reduction in Flood and drought Risk Management in changing scenario of climate and. Environment in India
- Flood Forecasting and Early Warning System & Role of Strategic preparedness tools in management of flood & drought and their National Guidelines
- Health aspects in flood and drought & Geoinformatics Applications in flood & drought disaster risk reduction
- Mitigation measures in India - Structural and Non- structural aspects of flood & drought
- Search & Rescue operation in flood & drought management & Incident Response System for them
- Flood & Drought Resilient structures for their Mitigation
- Experience sharing & Challenges ahead based on initiatives taken by the stakeholders & lesions learnt on flood and drought w.r.t. climate change – Panel Discussion

Methodology: Power point presentations, discussions, exercises, with question/ answer

Programme Schedule (Tentative)

Day I: 21st January, 2019

Session	Topic	Faculty
1000-1100	Registration	
1100 – 1130	Inauguration and Introduction	NIH Roorkee & NIDM
	Tea Break	
	Basics of Disaster Management and vulnerability of India	
1145 – 1300	Basic Concepts of Disaster Management and Disaster Risk Reduction with reference to flood & drought	NIDM
	Lunch Break	
1400 – 1530	Approaches & Pathways of Climate Resilient Development w.r.t. Hydro-meteorological disasters	NIDM
	Tea Break	
1545 – 1700	Role of Stakeholders in mainstreaming Flood & Drought Resilience	NIH Roorkee

Day II: 22nd January, 2019 Preparedness, Mitigation &DRR

Session	Topic	Faculty
0930 – 1015	Library	
1015 – 1130	Drought Monitoring & Declaration	NIH Roorkee
	Tea Break	
1145 – 1300	Flood mitigation measures & DRR - Structural and Early	NIH Roorkee

	Warning in India	
	Lunch Break	
1400 – 1515	Health aspects during flood & drought	NIH Roorkee
	Tea Break	
1530-1700	Forecasting and Early Warning of Hydro-meteorological disasters	NIH Roorkee
1700 - 1730	Group Formation & Exercise (based on case studies on floods & droughts & Films)	NIDM

Day III: 23rd January, 2019 Response & DRR

Session	Topic	Faculty
0930-1015	Library	
1015-1130	Search & Rescue operation in flood risk management	NIH Roorkee
	Tea Break	
1145-1300	Gender Issues in Flood & Drought Management & DRR	NIH Roorkee
	Lunch Break	
1400-1515	Geoinformatics Applications in flood, drought & Disaster risk reduction	NIH Roorkee /NIDM
	Tea Break	
1530 - 1700	Resilient Agriculture system for flood and drought w.r.t. Drought Manual 2016 & DRR	NIDM
	Tea Break	

Day IV: 24th January, 2019 Field Visit & Experience Sharing

Session	Topic	Faculty
0900 – 1400	Field Visit to flood & drought affected areas near to Roorkee	NIDM & NIH Roorkee
	Lunch Break	
1500 - 1700	Group Exercise (based on case studies on floods, droughts & Films)	NIDM

Day V: 25th January, 2019 Cross Cutting Issues & lessons learnt

Session	Topic	Faculty
0930 – 1100	Role of Community in DRR w.r.t. National Guidelines on flood and drought	NIH Roorkee
	Tea Break	
1130-1300	Group Exercise (based on case studies on floods & droughts)	NIDM
1300 - 1330	Group Presentation and Discussion followed by Feedback & Valediction	NIH Roorkee, & NIDM
	Lunch Break	

Attendance &Certificate

Marking attendance Forenoon and Afternoon is compulsory for certification. A certificate will be awarded to each participant on the successful completion of the programme.

Boarding & Lodging Arrangements

Boarding & Lodging facilities will be provided by NIH Roorkee. The confirmed participants will reach at NIH Roorkee (Uttarakhand).

COURSE TEAM

NIDM	NIH ROORKEE
COURSE DIRECTORS	
Dr. A.D. Kaushik Sr. Faculty, ECDRM Division Email: adkaushik@gmail.com **Dr. Anil K. Gupta** Associate Professor & Head, ECDRM Division Email: anilg.gov.in@gmail.com	**Dr. Rakesh Kumar** Scientist-G & Head Surface Water Hydrology Division National Institute of Hydrology Roorkee – 247667 (Uttarakhand), India Ph: 01332-249205, 275645 Fax: 01332-272123 Email: rakeshnih@gmail.com

Basic Reading Materials

Environment and Disasters

Disasters are environmental imperatives of this living world. Disaster risk is increasing with growing exposure of people and assets to natural hazards, which is known to be aggravated due to environmental changes, viz. climate change, land use changes, and natural resource degradation. Analysis shows that the substantial growth of population and assets in at-risk areas has been a biggest driver of disaster risk in recent years. Uncertainties associated with climate change impacts, as extreme events, coupled with limitations of climate projection downscaling, multi-hazard, multi-sector exposure of land, environment and resources and dependent property and people, particularly life and health called for a holistic understanding of disaster risk management. Migration to coastal areas and the expansion of cities in flood plains, coupled with inappropriate building construction, are among important reasons for increased disaster risk and vulnerability. Geo-climatic, environmental and socio-economic conditions in the regions of India make it severely prone to various natural disasters including flood and cyclone.

Disaster, as defined in the DM Act 2005, means *"a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man-made causes, or by accident or negligence which results in substantial loss of life or human suffering or damage to, and destruction of, property, or damage to, or degradation of, environment, and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area".*

According to the estimate, nearly 59% of India's land area is prone to earthquakes of moderate to high intensity, 68% land area is susceptible to droughts, nearly 12% is flood prone, 50% forest area is prone towards forest fire, about 8% is cyclone prone, 2% is landslide prone and a long coastline is exposed to tsunamis and storm surges. Of the 35 States and Union territories, as many as 27 are disaster prone. However, these vary significantly as the situation changes every year and every season. Besides, this doesn't account for urban floods, flash floods and cyclonic effects in non-coastal states or areas. And if the perceived threats due to other disasters such as chemical and terrorist attacks are added, every square inch of India is vulnerable, calling for immediate attention and sustained efforts.

Legal and Institutional Framework

The parliament of Indian enacted the National Disaster Management Act in 2005, which brings about a paradigm shift in India's approach to disaster management. The centre of gravity stands visibly shifted to preparedness, prevention and planning from earlier response and relief centric approach. The proposed legislation is in the Concurrent list of constitution thus having the advantage that it will permit the States also to enact their own legislation on disaster management. According to this Act, National Disaster Management Authority (NDMA) of which the Prime Minister of India is the Chairperson has the responsibility of laying down the policies, plans and guidelines for disaster management. Similarly, State Disaster Management Authorities (SDMAs), under the Chief Minister of the State and District Disaster Management Authority (DDMAs) co-chaired by District Collector and President of the elected body of the district are being developed to take the responsibility of down the policies, plans and guidelines for disaster management at State and District levels, respectively.

The crucial role of National Institute of Disaster Management (NIDM) is to plan and promote training and research in disaster management, documentation and development of national level information base relating to disaster management policies, prevention mechanism and mitigation measures. As per provisions of the DM Act, 2005, the Govt. of India has constituted National Disaster Response Force (NDRF) for the purpose of specialized response to disasters such as search, rescue, relief operations and rehabilitation. (http://disastermanagement.ap.gov.in/website/download/DM%20ACT-2005.pdf). There are disaster management funds available to the Union, State and District Authorities to meet the immediate needs of providing rescue and relief to the victims of Disasters. National Policy on Disaster Management, 2009, has also emphasized on the institutional arrangements for disaster risk management (Section 12.2.1 of DM Policy). The entire Disaster Management architecture needs to be supported by a solid foundation of frontline research and development efforts, offering sound and state-of-the-art science and technology options in a user friendly manner. (http://www.ndma.gov.in/images/guidelines/national-dm-policy2009.pdf).

Understanding Hydro-meteorological disasters and DRR

Climate change is known to aggravate hydro-meteorological disasters, as these comprise almost 70-80% of disasters globally in occurrence. India is one of the most flood and cyclone prone countries in the world. Every year, Indian sub-continent witnesses floods in different states/UT and cyclones in coastal areas, causing widespread miseries to the people and other forms of life including vegetation and animals. Floods, Cyclones & Droughts are the phenomena of nature which have caused great havoc of disastrous dimensions in India particularly in coastal areas. Among the natural hazards that affect the Indian coastal line, these hazards are known to be the most destructive to property, crops and infrastructure, and worst for causing death and injury. Environmental damage and ecological losses caused by these, and loss of assets and resources, cause risk recycling, i.e. aggravating future hazards and creating new and incremental layers to factors of disaster vulnerability.

Floods are any high stream flow which overlap natural or artificial banks of a river or a stream and are markedly higher than the usual as well as inundation of low land. Sometimes copious monsoon rains combine with massive flows from the rivers, then the floods indeed become calamitous. In India, 22 states and one Union territory (Andaman & Nicobar) are vulnerable to floods. However, the most vulnerable states of India are Uttar Pradesh, Bihar, Assam, West Bengal, Gujarat, Orissa, Andhra Pradesh, Madhya Pradesh, Maharashtra, Punjab and Jammu & Kashmir. On an average, an area of about 7 million hectares (17.50 mha maximum in 1978) was flooded, of which, on average crop area affected was of the order of 3.302 million hectares (10.15 m ha in 1988). The floods claimed on an average 1464 human life and 86288 heads of cattle dead every year. The National Commission on Floods (Rashtriya Barh Ayog) Government of India (1980) laid a great stress on proper flood management for the specific problems of the Ganga and the Brahmputra by adopting a suitable blend of structural and non-structural measures based on long term strategy with time and cost effectiveness, was evolved to mitigate the flood fury. Flood Plain Zoning aims to regulate the indiscriminate and unplanned development in flood plains. It is relevant both for unprotected as well as protected areas. Hydrological and hydro meteorological data from 175 flood forecasting stations located in different river basins of the country are collected, analyzed and then forecasts issued by Central Water Commission (CWC) for the benefit of State Governments and general public.

The impact of climate on water resources realizes that efficient management of water resources is only the key to economic growth and poverty alleviation. “This is so because about 70 per cent of India’s population is dependent on agriculture and about 83 per cent of the water is utilized for irrigation.” The National Water Policy (NWP) 2002 guided the formulation of policies and programmes for water resources development and its management. Thereafter, new challenges emerged in the water resources sector, which necessitated review of the National Water Policy. Accordingly, there should be a Master Plan for flood control and management for each flood prone basin. In flood control and management, the strategy should be to reduce the intensity of floods. Indiscriminate occupation of, and economic activity in coastal areas and flood plain zones should be regulated.

The country is one of the most flood prone countries in the world. Every monsoon season India witnesses floods in different States/UT, causing widespread miseries to the people. Flood is one of the phenomena of nature which has caused great havoc of disastrous dimensions in India. Among the natural hazards that affect the Indian Sub continent, flood is known to be the most destructive to property, crops and infrastructure, and one of the worst for causing death and injury. The need to combat the perennial problem of floods and the resultant destruction has been at the forefront of concern. Around 75% of the total rainfall in India is concentrated over 4 months of monsoon (June – September). Around 12% of the country’s land area is prone to floods which means around 40 million hectares are prone to flood and annually on an average 8 million is affected by floods. The most flood prone areas are the Brahmaputra, Ganga and the Meghna basins; the states are Uttar Pradesh, Bihar, West Bengal, Assam and Orissa. In the recent times, floods have also become a serious affair in the states of Tamil Nadu, Andhra Pradesh, Karnataka and Gujarat. India accounts for one- fifth of the global death count due to floods. Over 30 million people are displaced annually. Although it is impossible to prevent floods completely, losses due to floods can be minimized by better preparedness, mitigation, planning and timely response.

Mumbai flood 2005, Barmer (Rajasthan) flood 2006, Uttarakhand flood 2013, Jammu & Kashmir flood 2014 and Chennai flood 2015 witnessed the heaviest rainfall in the last 100 years and this caused massive flooding in many parts of the country resulting in disruption of normal life making many homeless and ending up with staying in Relief Camps. The flood also witnessed the impacts of for all types of sectors; however the people in the lower rung being the worst affected. This year, Kerala witnessed extreme flooding due to extreme rainfall events occurring almost across the State during the season, over 90% reservoir storage even before the onset of extreme rainfall events i.e. 1634.5 mm rainfall during the period May 1 to August 7, 2018 which is more than the average rainfall (1619.37 mm) during the summer monsoon period (June-September) and the catchment areas of major reservoirs in the State received extreme rainfall never before witnessed in the State.

Droughts have a wide range of effects on the masses in a developing country like India. The impact of droughts is specifically conspicuous in view of the tropical monsoon character of the country. Rainfall by the south-west monsoon is notorious for its vagaries. Drought is a normal, recurrent feature of climate and occurs in all climatic regimes and is usually characterized in terms of its spatial extension, intensity and duration. Conditions of drought appear when the rainfall is deficient in relation to the statistical multi-year average for a region, over an extended period of a season or year, or even more. Drought differs from other natural hazards such as cyclones, floods, earthquakes, volcanic eruptions, and tsunamis as being of slow-onset and difficult to determine the beginning and end of the event. Duration of a drought may range from months to years and the core area or epicenter changes over time, reinforcing the need for continuous monitoring of climate and water supply indicators.

Meteorological drought adversely affects the recharge of soil moisture, surface runoff and ground water table. Soils dry up, surface runoff is reduced and ground water level is lowered. Rivers, lakes, ponds and reservoirs tend to dry up wells and tube-wells are rendered unserviceable due to lowering of the ground water table. **Hydrological drought** is best defined as deficiencies in surface and subsurface water supplies leading to a lack of water for normal and specific needs. Such conditions arise, even in times of average (or above average) precipitation when increased usage of water diminishes the reserves. **Agricultural drought**, usually triggered by meteorological and hydrological droughts, occurs when soil moisture and rainfall are inadequate during the crop growing season causing extreme crop stress and wilting. Indian agriculture still largely depends upon monsoon rainfall where about two-thirds of the arable land lack irrigation facilities and is termed as rainfed. The effect is manifested in the shortfalls of agricultural production in drought years. History is replete with examples of serious shortfall in cultivated areas and drop in agricultural productivity. So, the shortfall in agricultural production may be the direct impact of meteorological droughts but the succeeding hydrological and agricultural droughts have a long range and far reaching impact on agriculture. While **social and economic** impact of a drought is more severe than the physical and agricultural impacts. A drought is almost invariably associated with famine which has its own social and economic consequences.

The India Meteorological Department (IMD) is the designated agency for providing drought early warning and forecasting. IMD predicted the first scientific monsoon in 1886. IMD identifies meteorological drought for subdivisions every year based on rainfall analysis. During the past 125 years, IMD has identified meteorological droughts (moderate or severe) over meteorological subdivisions of the country using IMD criteria and also drought years for the country as a whole. IMD also monitors agricultural drought once every two weeks on a real-time basis during the main crop seasons (kharif and rabi) of India.

In January 1988, the Government of India approved the establishment of the National Centre for Medium Range Weather Forecasting (NCMRWF) as a constituent unit of the Department of Science and Technology (DST) to help develop suitable Numerical Weather Prediction (NWP) models for medium-range weather forecasts (310 days in advance) and prepare agro-meteorological advisories for the farming community in 127 agro-climatic zones of India. The NCMRWF, in collaboration with the IMD, Indian Council of Agricultural Research (ICAR), and State Agricultural Universities (SAUs), provides agro-meteorological advisory service at the scale of agro-climatic zones to the farming community, based on location specific medium-range weather forecasts. NCMRWF disseminates weather forecasts (currently 4 days) to these units for their respective zones (through VSAT, fax or phone) and agricultural scientists of the concerned stations prepare advisories for the farmers which are then disseminated to the users through mass media (local newspapers radio, and TV), personal contact, extension personnel, etc. These bulletins are issued twice a week at most of these stations. Agro-meteorological advisory units also provide local agro-meteorological data and farmers' feedback on the advisories.

The Central Research Institute for Dryland Agriculture (CRIDA) in Hyderabad and the All India Coordinated Research Projects on Agri-meteorology and Dryland Agriculture (AICRPAM and AICRPDA), each having 25 centres under SAUs across the country take part in drought studies pertaining to assessment, mitigation, risk transfer, and development of decision support software for drought-prone States.

The Central Arid Zone Research Institute (CAZRI), in Jodhpur acts as repository of information on the status of natural resources and desertification processes and their control. It maintains 6 agro-meteorological observatories in their research stations at Jodhpur, Jaisalmer, Chandan, Bikaner, Pali, and Bhopalgarh. Besides, the CAZRI shares rainfall records of 100 rain gauge stations with the Rajasthan Irrigation Department and also with the IMD network of meteorological stations for assessing agricultural drought situation in 12 arid districts of western Rajasthan. Ministry of Earth Sciences in collaboration with ICAR has set up 89 centres for short and medium-range monitoring and forecasting of the weather.

Drought assessment is based on a comparative evaluation of satellite observed green vegetation cover (both area and greenness) of a district in any specific time period, with that of any similar period in previous years. This comparative evaluation helps in fixing the current season in the scale of historic agricultural situations. The National Agricultural Drought Assessment and Monitoring System (NADAMS) developed by the Department of Space for the Department of Agriculture and Cooperation, primarily monitors the vegetation through National Oceanic and Atmospheric Administration (NOAA) and prepares state-wise monthly reports.

In some parts of India, the failure of the monsoons result in water shortages, resulting in below-average crop yields. This is particularly true of major drought-prone regions such as southern and eastern Maharashtra northern Karnataka, Andhra Pradesh, Odisha and Gujarat. Telengana and Rajasthan. In 2017, South India is parched in Kerala, Karnataka and Tamil Nadu are already reeling under severe drought, and Andhra Pradesh and Telangana are on the brink due to the blistering heat waves which probably put more pressure on the existing water resources. While Kerala and Tamil Nadu are facing an unprecedented drought which was the worst ever in over a century, Karnataka's northern districts are without water for the third consecutive year. In October 2016, Andhra Pradesh was drought-hit due to a deficiency of 4 percent rainfall. Telangana, a perennially water-starved state, is engaged in water wars with its Telugu-speaking neighbour over allocations of Krishna and Godavari river water.

DM Policy of India recognized climate change as a key aspect contributing to frequency and intensity of hydro-climatic hazards and also increasing the vulnerability of land, ecosystems and socio-economic settings (National DM Policy, Section 5.1.7).Climate change is increasing the frequency of natural disasters globally and causing massive destruction in terms of loss of human life, assets and environment. It has been observed in the recent years that climate change has increased the magnitude & frequency of precipitation related disasters like floods, droughts, landslides, typhoons and cyclones. It fundamentally undermines the progress toward development objectives especially in urban areas which are the hotspots of vulnerability to various natural disasters. Large population density & inappropriate changes in land-use are exacerbating the livelihood challenges causing further issues like poverty, inequality & social disparity. Adaptation to the changing climate across all aspects of disaster risk management is needed to ensure our goal towards sustainable development & safety together.

Disaster risk reduction (DRR) is an integral part of sustainable development. For all developmental activities to be sustainable, disaster risk must be reduced. Growing climate change awareness, livelihood & sustainability concerns have brought about a second paradigm shift in disaster management approach worldwide. Now the focus is shifting from "disaster event & "minimizing effect of disaster to "addressing hazards, reducing vulnerability and ensuring sustainability along environment centric approach (http://i-s-e-t.org/resources/training/training-manual-climate-change.html). Sendai Framework for Disaster Risk Reduction, 2015- 2030 (SFDRR), Sustainable Development Goals, 2030 Agenda (SDGs) & Paris Climate Agreement, 2015 have made the global community realize and recognize that DRR, CCA & sustainable development are linked to each other. Efforts are continuously increasing to adapt to climate change & reduce the disaster risks but at the same time the economic & social cost of these disasters are increasing year by year. The theme of Sendai Framework i.e. Build Back Better" may be helpful to create new pathways & approaches for integration of CCA & DRR to combat the perennial problems of flood & drought and their resultant destruction has been at the forefront of concern for disaster managers and policy makers. NIDM being the national policy think tank and a premier institute of Government of India on capacity building is taking significant strides to support practitioners, policy makers, officials & academicians to pave a way to mainstream climate resilience and disaster risk reduction into developmental planning, with context of critical environmental and anthropogenic changes.

Course Directors
Dr. A.D. Kaushik, Sr. Faculty,
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&
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Suggested Readings:

- National Policy on Disaster Management 2009 http://www.ndma.gov.in/images/guidelines/national-dm-policy2009.pdf
- Government of India, National Disaster Management Authority (2008): National Disaster Management Guidelines, Management of Floods
- Guidelines for Planning and Construction of Roads in Cyclone Prone Areas CRRI Report – July 2013, Sponsored by National Disaster Management Authority, Govt. of India http://ncrmp.gov.in/ncrmp/Cyclone_Impact.html
- Secretariat of The World Meteorological Organization, Geneva Switzerland, World Meteorological Organization Technical Document (2012): Tropical Cyclone Operational Plan for The Bay of Bengal and the Arabian Sea.
- Gupta, A.K., Singh, S., Katyal, S., Chopde, S., Wajih, S.A., Kumar, A., 2016). Training Manual on Climate Resilient and Disaster Safe Development - Process Framework, NIDM, New Delhi (India), GEAG, Gorakhpur (UP, India) and ISET, Colorado (USA), supported by CDKN, UK. http://geagindia.org/pdf/GEAG-Climate-Resilient-2017.pdf
- Kaushik, Ashutosh Dev (2012). Flood Risk Mitigation and Management: ToT Module. National Institute of Disaster Management, New Delhi-110002, pages 179. http://nidm.gov.in/PDF/modules/flood.pdf
- Gupta, A.K., Nair, S.S., Wajih, S.A., & Dey, S. (2013). Flood Disaster Risk Management: Gorakhpur Case Study. http://www.preventionweb.net/educational/view/31503 Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Germany, 116 p. http://nidm.gov.in/PDF/modules/flood2.pdf
- Vogelbacher, A. (2013). Flood Disaster Risk Management - Hydrological Forecasts: Requirements and Best Practices (Training Module). National Institute of Disaster Management, New Delhi and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Germany, 88 p. http://www.preventionweb.net/educational/view/31586
- Gupta AK et al (2014). Strengthening climate resilience through disaster risk reduction: approach in Andhra Pradesh and Tamil Nadu in India - experience and lessons. Deutsche Gesellschaft für

Internationale Zusammenarbeit (GIZ) GmbH, Germany, http://www.preventionweb.net/publications/view/37390

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- Gupta AK, Nair SS (2012). Ecosystem Approach to Disaster Risk Management. NIDM, New Delhi & UNEP PEDRR Geneva. https://www.gdnonline.org/resources/nidm_ecosystem_approach.pdf
- http://nidm.gov.in/PDF/manuals/Drought_Manual.pdf
- https://reliefweb.int/report/india/south-india-floods-2009-humanitarian-appeal
- https://reliefweb.int/sites/reliefweb.int/files/resources/jna-report-tamilnadu-december-2015.pdf
- https://www.thehindu.com/news/national/kerala/kerala-floods-iit-professor-four-major-factors-for-disaster/article25021967.ece
- https://www.firstpost.com/india/south-indias-drought-part-1-five-states-face-a-severe-water-crisis-made-worse-by-the-onset-of-summer-3394636.html
- https://en.wikipedia.org/wiki/Drought_in_India

PLEASE WRITE IN CAPITAL LETTERS

National Institute of Disaster Management

(Ministry of Home Affairs, Govt. of India)
Website: www.nidm.net **&** www.nidm.gov.in

In collaboration with

National Institute of Hydrology (NIH), Roorkee (Uttarakhand)

Website: http://nihroorkee.gov.in/

Nomination Form

Name of Programme: **National level Training Programme on "Flood and Drought Risk Management"**

Date: 21 to 25 January, 2019

Venue: National Institute of Hydrology (NIH), Roorkee (Uttarakhand)

Name of Participant:____

Designation: ______________________________**Age**______________________

Name & Address of the Organization_________________________________

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Address for Correspondence:_______________________________________

____

Tel: STD Code: __________ **Office:** ____________ **Residence:**_____________

Mobile:__________________________**Fax:**_____________________ ________

Email:____________________________**Bloodgroup** ______________________

Academic Background:____

Whether accommodation required: Yes/ No

Signature of nominee

Date: **Signature & Seal of Nominating Authority**

PR: Please send the filled nomination to Dr. Rakesh Kumar, NIH Roorkee, (rakeshnih@gmail.com). Fax: 01332-272123, 273976. Last date of Receiving of Nominations is 05.01.2019.