

<b>Course title:</b> Climate Change and Disaster Risk Reduction				
<b>Course code:</b> NRC 162	<b>No. of credits:</b> 3	<b>L-T-P:</b> 30-12-0	<b>Learning hours:</b> 42	
<b>Pre-requisite course code and title (if any):</b>				
<b>Department:</b> Department of Energy and Environment				
<b>Course coordinator:</b>		<b>Course instructor:</b> Dr Anil Kumar Gupta		
<b>Contact details:</b> anil.nidm@nic.in				
<b>Course type:</b> Elective		<b>Course offered in:</b> 3 <sup>rd</sup> semester		
<b>Course Description</b>				
<p>Climate change is known to increase disaster intensities and frequency by aggravating hazards and the factors determining vulnerability of environment, inhabiting communities and their resources. There has been a paradigm shift in approach to disaster management from response and relief centric to risk management centric, and thus, calling integration of climate change adaptation and sustainability concerns along DRR into developmental process. This course introduces the concepts, tools, methods for disaster risk management, specifically for climate and weather-related disasters; role of policies and frameworks at international, national and sub-national contexts, with focus on emerging issues and recent developments. Students are expected to attend the class after going through the reference reading materials, and participate in the guided exercises (tutorials) and undertake assignments in order to enable relevant knowledge base on the subject</p>				
<b>Course objectives</b>				
<ul style="list-style-type: none"> <li>▪ To provide a systematic knowledge base on disaster typology, risk, vulnerability, their impacts and concerns to growing hydro-met disasters,</li> <li>▪ To comprehend on approaches and measures of disaster management, preparedness and response, and related policies, law and methods,</li> <li>▪ To enumerate on possible pathways, tools and options for CCA-DRR and sustainability mainstreaming through developmental planning at sectors, department or local levels, and activities</li> </ul>				
<b>Course Contents</b>				
<b>Module</b>	<b>Topic</b>	<b>L</b>	<b>T</b>	<b>P</b>
1.	<b>Introduction to fundamentals of DRR</b> Environment-development and disasters; Disaster typology and classification; Basic concepts and terminologies- Hazard, Risk, Vulnerability, Disaster, Mitigation, DRR and its evolution, DRM, Emergency, Response, Relief; Resilience, Reconstruction, Recovery; Hydro-meteorological and related disasters; Disaster vulnerability of the region/country.	4		
2.	<b>Climate Variability &amp; Disaster Risk</b> Climate change, climate variability and implications on disaster risk; Climatic extreme events and disasters–global, regional and national scenario, predictions and projections. Climate change effects on disaster vulnerabilities–environmental & land/geography, social-economic, health, infrastructure, systems, etc; Recent hydro-met disasters. Climate change issues for human security, national security, trans-boundary disasters and conflicts.	6	2	

3.	<b>Disaster Risk Mitigation</b> Disaster management journey and paradigm shift; Approaches in disaster management–Engineering centric, CBDP, Indent management, ecoDRR, etc. Structural and non-structural measures of mitigation–for hydro-met disasters, extremes and health risks–International and national policy frameworks and guidelines.	4		
4.	<b>Disaster Risk Management</b> Tools and Methods in Disaster Risk Management: Hazard, risk and vulnerability analysis; Legislations, Codes & Standards, Risk sensitive land use planning, Safety auditing, Role of EIA/SEA, REA of Disasters, Situation analysis, Incident response system, PDNA, Environmental economics & DRR, Recovery framework. DM Planning for Government at national/sub-national, ministry/departments, organization/establishments and at local levels.	4	4	
5.	<b>Disaster Preparedness</b> Crisis management, Early warning and communication, Emergency response, Local preparedness, Relief management-Shelter, WATSAN, environmental health, trauma care; Role of agencies, technology and coordination; Issues of green relief, sustainable recovery, built back better; CCA-DRR and sustainability integration into post-disaster/post-conflict development, International response.	4	2	
6.	<b>Challenges and issues</b> Issues in Urban, Rural and Industrial disaster risks management w.r.t. climate change. Resilient agriculture, Disaster Resilient - Infrastructure, Industry, Livelihoods, Schools, Hospitals, etc. Issues of special needs – gender, aged, children, disabled, psycho-social, etc.	4	4	
7.	<b>Mainstreaming CCA-DRR</b> Role and need of CCA-DRR integration; Options, pathways and mechanisms; evolution of Yokohama, HFA, SFDRR, Integrated implementation. NRM-DRM integration, ecosystem-based adaptation and eco DRR; Role of Green growth, REDD++ and sustainable NRM – IWRM, Watershed, River basin, ICZM, Socio-economic resilience, Capacity building, etc.	4		
	<b>Total</b>	<b>30</b>	<b>12</b>	<b>0</b>
<b>Evaluation procedure</b>				
<ul style="list-style-type: none"> <li>▪ 2 Assignments : 40%</li> <li>▪ Tests 1 : 15%</li> <li>▪ Tests 2 : 15%</li> <li>▪ Test 3 : 30%</li> </ul>				
<b>Learning outcomes</b>				

- To develop a sound understanding of disaster risk and related underlying factors, their impacts,
- To appreciate and comprehend on approaches and measures of disaster management, preparedness and response, and related policies, law and methods
- To know various pathways, tools and entry points for integrating CCA-DRR and sustainability concerns into developmental planning across sectors, national, sub-national and local plans and actions of DM.

### **Pedagogical approach**

Classroom teaching will involve power point presentations, case study analysis and assignment-based seminar.

### **Suggested Readings**

1. Rajib Shaw and R.R. Krishnamurthy (2009). Disaster Management: Global Challenges and Local Solutions. Universities Press (India) Pvt. Ltd.
2. Ross Prizzia (2015). Climate Change and Disaster Management. Sentia Publishing, USA.
3. Anil K Gupta, S S Nair, S Chatterji and Florian B-Lux (2013). Disaster Management and Risk Reduction. Narosa Publishing New Delhi.
4. Anil K Gupta, S S Nair and V K Sharma (2018). Disaster Risk and Impact Management, Astral Publishing, New Delhi.
5. Anil K Gupta, Jane Eppers and Ilona Porche (2011). Adaptation in Disaster Risk Management. The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and Govt of India MoEFCC.
6. Anil K Gupta, S Singh, S A Wajih (2017). Urban Resilience and Sustainability Through Peri-urban Ecosystem. Rockefeller Foundation, USA and GEAG India.
7. Anil K Gupta, S Singh, S Katyal and S A Wajih (2016). Prime Minister's Agenda 10: India's Disaster Risk Management: Roadmap to Climate Resilient and Sustainable Development. CDKN – UK, ISET USA and GEAG India.
8. Anil K Gupta, S Singh, S Katyal and S A Wajih (2016). Climate Resilient and Disaster Safe Development: Process Framework. CDKN UK, ISET USA.
9. Anil K Gupta, S S Nair (2014). Mainstreaming Climate Change Adaptation and Disaster Risk Reduction into District Level Development Plans. CDKN UK, ISET USA and NIDM India.
10. Anil K Gupta, S S Nair (2013). Environmental Legislation for Disaster Risk Management. The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and NIDM India.
11. Anil K Gupta, S S Nair (2012). Environmental Extremes - Disaster Risk Management: Addressing Climate Change. NIDM New Delhi, India.
12. <http://drought.unl.edu/Portals/0/docs/international/India%20Drought%20Manual%202016.pdf>

### **Case studies**

1. Uttarakhand Disaster 2013, Cyclone Phailin 2014, Kashmir Flood 2015, Drought 2015, Forest Fire 2015
2. Heat wave 2015-16, Cyclone Hudhud, Bundelkhand drought, etc.
3. IPCC-SREX Case Studies [https://www.ipcc.ch/pdf/special-reports/srex/SREX-Chap9\\_FINAL.pdf](https://www.ipcc.ch/pdf/special-reports/srex/SREX-Chap9_FINAL.pdf)

4. EcoDRR <https://www.preventionweb.net/publications/view/26498>

### **Websites**

1. UN-ISDR <https://www.unisdr.org/>
2. PEDRR <http://pedrr.org/>
3. IUCN CEM <https://www.iucn.org/commissions/commission-ecosystem-management/regions/south-asia>
4. CDKN [https://cdkn.org/themes/theme-disaster-risk-management/?loclang=en\\_gb](https://cdkn.org/themes/theme-disaster-risk-management/?loclang=en_gb)
5. WMO <http://www.wmo.int/pages/prog/drr/>
6. NIDM <http://nidm.gov.in/default.asp>
7. NDMA <http://www.ndma.gov.in/en/>
8. <https://www.beforetheflood.com/>
9. Researchgate [https://www.researchgate.net/profile/Anil\\_Gupta15](https://www.researchgate.net/profile/Anil_Gupta15)

### **Journals**

1. Disaster Resilience in Built Environment (Emerald)
2. International Journal of Disaster Risk Reduction (Elsevier)
3. Journal of Geography and Natural Disasters (Omics)
4. International Journal of Disaster Risk Science (Springer)
5. Disaster and Development Journal (NIDM)

### **Additional information (if any)**

#### **Student responsibilities**

The students are expected to submit assignments in time and come prepared with readings when provided.

### **Course Reviewers**

The course is reviewed by the following experts.

1. Prof. V K Sharma, Vice Chairman, Sikkim State Disaster Management Authority, IIPA, New Delhi.
2. Prof. Rajib Shaw (UNISDR S&T Council Convenor), Keio University, Japan.