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## DISASTER MANAGEMENT AND CLIMATE CHANGE: SELECT ASSIGNMENTS

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In order to enhance the emergency service needs at Hazira during a major disaster, Hazira Notifies Area and Disaster Prevention and Management Committee awarded TARU to undertake a scoping study towards **Design and Establishment of Disaster Prevention and Management Centre (DPMC Hazira)**. The scoping study team used a detailed research methodology to develop a comprehensive list of operational and functional requirements, develop a list of key components and recommend essential features for design and construction of the DPMC. The study features important aspects of Operations, Functions, Design and Establishment (resource needs) aspects of the centre. Experiences have been drawn from international and national best practices as part of the research exercise. The study also outlines the hazard risk and vulnerability aspects of Hazira and its surrounding environs, establishes emergency response objectives of the centre, framework determining the operational functions of the centre – command – control – coordination centre, communication systems design including interoperability aspects, team composition of the centre, equipment cache details, building configuration and plans, financial outlay and implementation plan.

TARU undertook the **Multi Hazard Risk Assessment in Myanmar** for UNDP Myanmar. The study assessed the hazard risks in the Ayeyarwady delta and conducted in depth vulnerability assessment of the region to prevalent natural hazards. The study focussed on developing a multi hazard risk assessment for the cyclone affected areas using probabilistic scenario based approach with the goal of providing inputs to the ongoing recovery and CBDRM programmes. Key task includes Hazard Risk Assessment of major hazards (Wind and Cyclone, Storm Surge, Earthquake, Tsunami and Fire), Vulnerability Assessment of urban and rural areas, sector wide assessment, development of composite risk maps, review of Community Based Disaster Risk Management (CBDRM) programmes / recovery efforts in rural and urban areas of cyclone Nargis affected region, and set of recommendations and policy directions to reduce the degree of exposure to future events.

TARU has undertaken the task of **Integrating Environment & Vulnerability to Climate Change into Local Planning in West Bengal**. The range of Gram Panchayat (GP) functions make them potentially very important institutions for addressing a wide range of environmental issues including natural resource management, water conservation, environmental health, natural disasters and climate change. GPs in theory should have a key role to play in supporting the identification and implementation of appropriate adaptation strategies, as well as in monitoring indicators of climatic stress and disseminating relevant information to communities. This assignment attempts in addressing a wide range of environmental issues and integrating them into GP planning along with developing capacity building and training programme for PRI bodies.

In continuance to the Phase-I of the Rockefeller Foundation's initiative on "**Asian Cities Climate Change Resilience Network (ACCCRN)**", TARU has been engaged to be the implementing partner for the **Development of Urban Climate Change Resilience Action Plan** for the cities of Indore and Surat (ACCCRN Phase II). The core strategy is to develop implementation proposals that are owned by city-level advisory body comprising of stakeholders drawn from key organisations including the Municipal Corporation, Development Authority, Private Sector, Academia, Community based organizations. . TARU in association with the city stakeholders has undertaken assessment of climate related risks, in-depth vulnerability and risk assessment studies, technical and management support to the city stakeholders in undertaking sector studies (Water, Energy, Public Health, Environment, Green Buildings, Urban Transport, Flood Risk Management), develop locally appropriate resilience strategies focussing to sector as well as city-wide, help develop technically sound project proposals for implementation under the ACCCRN (Pilot interventions to build resilience / Implementation of Urban Resilience Projects); facilitate the development of city wide climate resilience plan, facilitate the development of replicable processes by participating in state and national level consultations, suggest methodologies and core insights on strategies for adapting to climate change in urban settings through development of a knowledge network involving cities and other project partners; and facilitate the cities to obtain funding support for resilience interventions. TARU is continuing with activities and engagement with cities across India in the capacity of country coordinator for **ACCCRN Phase III** (2010-2013)

TARU helped Gujarat State Disaster Management Authority (GSDMA) in assessment of the evidence and impacts of recent deviations of climatic conditions and to formulate a plan to adapt to these changes, to mitigate their impacts and to reduce vulnerability in Gujarat as part of the ongoing project on "***Climate Variability and climate change – Disaster Risk scoping study for Gujarat***". The objective is to examine whether climate variability and change could have a significant impact on the population, economy and infrastructure in Gujarat, largely through the occurrence of flood, drought, cyclone and storm surge, extreme rainfall events and potential sea level rise over the next 50 years.

This study being done for Institute for Social and Environmental Transition (ISET) on behalf of National Oceanic and Atmospheric Administration (NOAA) **to design and develop a set of tools to help managers assess their water system for resilience to climatic and social variability, identify and evaluate potential adaptation strategies**, and create a process to deal with climatic and social change. Frameworks and tools are being developed to enable communication between the formal and informal water sectors.

Our **Hazard Risk and Vulnerability Assessment and Composite Risk Atlas for Gujarat** is the first Level 1 composite risk assessment and mitigation plan at sub-regional scale outside the United States of America (USA). This 200-page atlas, backed by 1,500 pages of Technical Papers, is an internationally recognized peer reviewed publication and GIS-assisted planning framework developed for the Gujarat State Disaster Management Agency (GSDMA), Government of Gujarat (GoG). Covering six natural hazards- cyclonic storm, drought, earthquake, flood, storm surge and tsunami- with manmade hazards of chemical and industrial accident at a scale of 0.25 x 0.25 degrees across 226 talukas and 26 districts of this State of 50 million people, it involved assessment of natural and manmade hazards, physical, social and economic vulnerabilities and a probabilistic composite risk assessment. Hazard risk, vulnerability and composite risk was assessed of over 75 percent of the capital stock and 80 percent of the economic value added across the units of enquiry covering rural and urban

populations, buildings, critical infrastructure (highways, power and pipeline systems, irrigation and water supply systems, ports and airports), enterprises and economic activity. The output can be used to prioritize and locate public and private investment, plan mitigation measures and assess risk to various elements of the State economy.

Following from Hazard Risk and Vulnerability Assessment and Composite Risk Atlas for Gujarat, we are currently working on the **Development of the User Manual, Capacity Building of Staff and Internet Map Service (IMS) on Hazard Risk and Vulnerability Analysis**. This ongoing task includes training of government officials at various levels in using the Atlas for planning and mitigation. For this, a multimedia training kit is being developed. An IMS is proposed to be installed in the Gujarat State Wide Area Network to enable decision-makers to access the Atlas through the Internet. The IMS will provide query support and zoomable maps.

The **Gujarat Action Plan for Cyclone, Storm Surge and Tsunami Risk Mitigation** was prepared under the World Bank-supported National Cyclone Risk Mitigation Programme (NCRMP). Involving technical and project management support, this will cover over 700 settlements in 13 coastal districts and inland areas at risk to cyclonic winds surge and inland flooding. The mitigation plan will include critical infrastructure development, coastal environmental management, evacuation planning and the appraisal, design and construction of a network of cyclone and storm surge refuges and shelters.

The GoG-commissioned **Hazira Area Disaster Management Plan** is the first comprehensive multi-hazard risk assessment of a large coastal industrial concentration in India. Hazira, with a total investment of over USD 12 billion, includes a LNG terminal, two ports, a large steel plant, fertiliser and petrochemical complexes, multiple power plants and other facilities. TARU critically assessed hazard and risk associated with cyclone, earthquake, flooding, storm surge and chemical and industrial accidents and recommendations were made on Hazard Modification and Structural Mitigation to reduce the impact of natural disaster in Hazira.

TARU is the **India Partner to the Asian Cities Climate Change Resilience Network (ACCCRN)**. The Rockefeller Foundation has recently embarked on this major climate change initiative that concentrates on building resilience to a changing, challenging natural environment. It focuses on developing new tools, techniques and strategies to address climate risk, poverty and precipitous urbanization with the objective to develop a network of cities in Asia that will have robust plans to prepare, withstand and recover from the predicted impacts of climate change. (The Programme covers India, Indonesia, Thailand and Vietnam.) In India, six cities representing different climate risks were selected for initial analysis and engagement with public and private sector institutions, civil society and elected representatives. Detailed work to design and implement pro-poor climate risk adaptation processes is being taken forward in two of these- Indore and Surat.

The **India/ World4 model** was a dynamic global computer model to provide policy support tools for the IPCC (climate change negotiations). An extension of the seminal World3 model constructed at MIT for the Club of Rome, this examined the impact of human population and national economies on the global environment and explored potential trajectories for the global economy over the 1950-2100 period. TARU developed the regional model for India in collaboration with other international institutions.

IIED and the Earth Institute, Columbia University commissioned TARU to prepare the India background paper for the Global Urban Summit on **Climate Change Risk and an Adaptation and Mitigation Agenda for Indian Cities**. The Paper reviewed all major climate change risks to Indian cities, identified populations and elements at risk and attempted to define a climate change adaptation and mitigation framework for Indian cities.

TARU was retained by the Government of Andhra Pradesh (GoAP) to assist the preparation of the **Cyclone Emergency Rehabilitation and Hazard Mitigation Programme** in consultation with the World Bank. The tasks included clarification of objectives, assistance in preparation of area and sector specific plans such that long-term mitigation objects were pragmatically balanced with imperatives of current reconstruction, keeping in view the resource situation of the GoAP.

TARU recently undertook an **Evaluation of UNICEF's Flood Emergency Response in Bihar and Uttar Pradesh (UP)**. The impact of floods in 2007 was among the worst in the country in decades affecting almost 60 million people with more than 3,300 human casualties. The evaluation is expected to contribute to UNICEF's overall commitment towards accountability and improved performance and enrich its future emergency response and recovery programmes vis-à-vis its Corporate Core Commitment (CCC).

Undertaken for the Government of India (GoI), the **Damage Assessment and Building Reconstruction Options for Kachchh Earthquake (2001)-affected Areas**, aimed at zonation of affected areas and estimates of the total loss to buildings by building type and damage grade, identification of priority intervention areas in the short and medium term and development of a technology package detailing specifications and repair and reconstruction costs for various types of damaged buildings. The preparation of a technical Visual Damage Identification Guide (VDIG) for the field assessment of damage was also undertaken.

Our **Assessment of Cyclone Damage to Buildings and Lifeline Infrastructure in Orissa** affected by the super-cyclone 05B-99 for the Ministry of Urban Affairs and Employment, Government of India (GoI), included damage zonation of cyclone, storm surge and flood affected areas, assessment of the pattern of loss of life and damage to building stock and lifeline infrastructure, to understand the causes of high levels of casualty and damage in terms of vulnerability, hazard and warning.

As part of the **Joint Monitoring Review of the Orissa Post Cyclone Reconstruction of Primary Schools Project**, we supported the Orissa State Disaster Management Authority (OSDMA) and the Orissa Primary Education Programme Authority (OPEPA) to reconstruct 3,500 school buildings across super-cyclone affected districts in Orissa through Village Education Committees (VECs) and community-based contracting at a project cost of Rs. 2.5 billion. This is the largest rural infrastructure reconstruction work in the Orissa to date and our project management and technical support to DFID India and the Government of Orissa (GoO) involved on-site technical evaluation of the constructed schools, village and community level participatory assessments, structured surveys, institutional appraisals and other management advice to the OPEPA and DFID India.

The **Damage Assessment of Cyclone-affected areas of Gujarat (1998)** and **Rapid Damage Assessment of the Cyclone-affected Areas of Andhra Pradesh (1999)** was undertaken for the Government of India (GoI) and established the cyclone track and damage zonation, assessed broad damage to buildings of various types and examined impact on infrastructure and economic activity. The assessments broke new ground in the assessment of surge and

wind damage to buildings and was followed by the preparation of a Visual Damage Identification Guide (VDIG) to assist damage classification by building type and grade. A detailed building damage appraisal was also undertaken to identify the mechanisms of damage, loss ratios and technical options for repair and reconstruction to buildings. This led to the development of an India-specific cyclone damage gradation schema.

Appointed by Government of India (GoI) to prepare **Earthquake Reconstruction Plans** for the earthquake-affected regions of **Uttarkashi (1991), Marathwada (1993), Jabalpur (1997) and Chamoli (1999)**, TARU identified technological and community-based strategies for reconstruction and investment profiles. These contributed to the recommendations of GoI's Crisis Management Unit set up for the purpose.

Our **Multi-sector Assessment of Drought Impacts in Select Regions of South India** was undertaken for Oxfam India and covered four drought-affected districts in **Andhra Pradesh (AP), Karnataka and Maharashtra**. Based on field assessments and consultations at the district level, the exercise assessed the situation from a sector-specific perspective (covering Agriculture/Agronomy, Animal husbandry, Food and Nutrition, Drinking Water, Livelihoods, Employment and Migration, and Programme Logistics including Relief) to arrive at the extent of current crisis and possible impacts; and, suggested possible interventions for the short-term (6 months) and medium-term (3-5 years).

As part of its examination of **Drought Relief and Assistance Processes in AP**, TARU assisted UNICEF in tracking GoAP assistance in four districts of the State following the declaration of drought in 2001 and undertook a stakeholder analysis to understand beneficiary impacts, role of different institutions and measures to improve service delivery. The focus was on drinking water, food security and related social safety net programmes. The work informed UNICEF's strategies for drought relief and mitigation in AP.

TARU assisted the **Resettlement and Reconstruction of Aungi Village** in Uttarkashi, Uttaranchal (now Uttarakhand) after the 1991 earthquake to present a model for technically sound and culturally viable intervention. A **Reconstruction Programme for Holi Village** in Marathwada was later developed in collaboration with HDFC.

TARU prepared the **Action Plan for Affected Areas** following the **Punjab/ Haryana Flood** for the Building Material and Technology Promotion Council (BMTPC), GoI. A scientific method of assessing flood intensity and damage and simple measures to strengthen and retrofit buildings were identified.

Our **Evaluation of the Gujarat Earthquake Rehabilitation Program (GERP)** was undertaken for Concern Worldwide, India. The exercise measured the extent to which the program was successfully implemented; examined the issues and challenges people faced in the post-earthquake situation and the extent to which these were addressed by the GERP; and, drew lessons and made recommendations for Concern (and its partners) in preparing for, and responding to, future emergencies.

The **Rapid Impact Assessment of the Gujarat Relief & Rehabilitation Project (GRRP)**, a child-centred relief and rehabilitation initiative, was undertaken for Save the Children (SC), UK. SC was involved in post-disaster relief, addressing diverse household, shelter and medical needs, before embarking on a medium-term rehabilitation program.

TARU assisted the **Coastal Area Plan**, supported by the European Union through **Oxfam/HIVOS** and implemented by five NGOs, in the cyclone-affected coastal regions of East Godavari district in Andhra Pradesh. This was a three-year programme with components of community based disaster mitigation, contingency planning, strengthening/ reconstruction of damaged houses and lifeline infrastructure and we provided project management assistance and community-based disaster mitigation expertise to it.