Pilot Study on "Climate Change Vulnerability Assessment in Industries"

Under the ASEM Programme of the Indo German Development Cooperation, GIZ has initiated a pilot study on "Climate Change Vulnerability Assessment in Industries" in Gujarat. The study has been taken up for selected industries in Naroda Industrial Estate located near Ahmedabad main city.

The study has been taken up through the Gujarat Cleaner Production Centre (GCPC) during November 2011 under techncial guidance from Adelphi, Germany. GCPC was established in August 1998 by Industries and Mines Department of the Government of Gujarat with the technical support of UNIDO (United Nations Industrial Development Organization) and is actively engaged in promotional activities of cleaner production and sustainable industrial development.

The purpose of the study undertaken for identified industries in the Naroda Industrial Estate near Ahemdabad in the state of Gujarat was to assess vulnerability of industries to climate change on a case study basis so as to establish the relevance to industries, as well as test and establish a methodology for further replication in other industrial areas.

During the study, it has been observed that in past forty years, Gujarat has experienced 12 years of drought and four major scarcity situations and that the the intensity and return period of major drought events have increased substantially in last couple of decades. Also, it is observed that there would be a general increase in rainfall over western part of the India with more intense rain events. This may possibly be correlated to the climate change. The need was seen to study systematically the impact phenomenon, especially on to industries and industrial areas.

The potential direct and indirect losses to industries are summarised in Table below.

Potentail Direct and Indirect Losses to Industries from Climate Change

Direct Losses	Indirect Losses
Primary Direct Losses	**Primary Indirect Losses**
Physical damage to buildings	Loss of production due to direct damages
Physical damage to production equipments	Loss of production due to infrastructure disruptions
Physical damage to raw material	Loss of production due to supply chain disruptions
Physical damage to product in stock	
Physical damage to semi-finished products	
Physical damage to control installations	
Physical damage to service installations	
Secondary Direct Losses	**Secondary Indirect Losses**
Secondary hazards and damages (e.g. due to explosions)	Market disturbances (e.g. from higher prices for raw materials)
Costs for remediation and emergency measures	Decreased competiveness
	Damage to company's image
	Extra labour for process recovery

The study carried out by GCPC included the following main steps:

- Training to GCPC team by GIZ experts on climate change adaption and mitigation, vulnerability assessment grid, past and future impact assessment in industries.
- Identification of volunteering climate sensitive industries (upto 5 nos.)
- Undertaking assessment in the identified industries
- Report preparation
- Stakeholder dialogue

The three industries initially selected inlcuded one industry each from Dyes & Dye Intermediate, Textiles and Chemical sector. These industry sectors are strongly dependent on the energy, water and transportation, and on workers as well, and these factors are highly vulnerable to climate change.

For the Vulnerability-Risk Assessment (VA) of selected industries, a self-explanatory assessment matrix for the selection of sectors relevant for the Naroda Industries Association was used. A standard format for questionnaire sheet was prepared to assess the impact on:

- Infrastructure,
- People
- Process,
- Market,
- Logistics stocks, and
- Finance.

Data was collected through field visit to the industries. After having a good conception of the topic, the literature review was carried out to have a better understanding of the problems, and thus the methods and approaches to be used were decided. The problems in and around the study area were analyzed and accordingly countermeasures were framed depending on the availibity of the data.

On assessing the data collected, the following reactive adaptation measures were identified :

Vulnerable sources	Reactive Adaptations	Anticipatory Adaptations
Water Resources	▪ Protection of groundwater resources ▪ Improved management and maintenance of existing water supply systems ▪ Protection of water catchment areas ▪ Improved water supply ▪ Groundwater and rainwater harvesting and desalination	▪ Better use of recycled water ▪ Conservation of water catchment areas ▪ Improved system of water management ▪ Water policy reform including pricing and irrigation policies ▪ Development of flood controls and drought monitoring
Energy Resources	▪ Improved energy supply ▪ Increasing energy efficiency by proper measures like putting machine on invertors	▪ Better use of recycled energy ▪ Developing the efficiency of machines ▪ Use of renewable sources

		at maximum extent
Human health	▪ Public health management reform ▪ Improved housing and living conditions ▪ Improved emergency response	▪ Development of early warning system ▪ Better and/or improved disease/vector surveillance and monitoring ▪ Improvement of environmental quality ▪ Changes in urban and housing design
Transportation	▪ Use of electric or compressed natural gas based vehicle or Hybrid vehicle ▪ Implementation of vehicle emission standard ▪ Executive employees use public transportation	▪ Focusing on mode switching and other behaviors affecting transportation ▪ Encourage the use of Cleaner alternative fuel

The assessment of vulnerability to climate change is designed to provide critical information for adaptive management, including planning, development actions as well as conservation initiatives.

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