RAINWATER HARVESTING FOR DISASTER RISK REDUCTION IN FLOOD AND DROUGHT CRISSES - INDIAN EXPERIENCE

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Natural Disasters on the Rise Around the Globe

Number of natural disasters* by type of event (1980-2019)

- Hydrological
- Meteorological
- Climatological
- Geophysical**

* Registered as relevant loss events by MunichRe
** Volcanic/tectonic activity

Source: MunichRe
Kerala Floods- August 2018

Departure from Normal +96 %

- More than 450 people lost
- Crop damage in agriculture sector – 20,000 Crores
- More than 50,000 houses lost
- Over 8.6 lakh people have taken shelter in nearly 3,000 relief camps
10 FACTS ON CLIMATE CHANGE FROM IPCC REPORT

1. In the next 20 years the global warming will breach the threshold of 1.5°C
2. If we continue to emit greenhouse gases as now, global warming will be above 2°C by mid-2100s.
3. With every 1°C rise in temperature, there will be a 7 per cent increase in the intensification of extreme rain events
4. Carbon dioxide concentration is highest in 2 million years
5. Sea-level rise is the fastest in 3,000 years
6. Arctic sea ice is lowest in 1,000 years
7. Some changes we can’t reverse any more, at least for next thousands of years
8. Ice melting will continue for the next 1,000 years even if we manage to control our GHG emissions
9. Ocean warming will continue, which has increased by 2-8 times from 1970s
10. Sea-level rise will continue for hundreds of years

www.downtoearth.org.in
Climate Action- Mitigation & Adaptation

Mitigation
- Renewable energy
- More efficient industrial processes
- Eco-friendly transportation
- Seasonal eating and less meat

Adaptation
- More resilient agricultural species
- Increase in urban green areas
- Delimitation of coastal risk areas
- Entomological surveillance
- Awareness-raising
- Water and energy saving
- Flood barriers in urban spaces

RWH
Quantity
Quality
Deficit
Excess
Demand
Supply
Blue
Green
Grey
Reduce
Reuse
Recycle
Recharge
Harvest
Protect
Keep clean
Innovative - Strategies/technologies
Water resources development and management in India
Implementation of proper strategies and action plan for achieving water security

Broad areas to be addressed

I. Supply Sector
II. Demand Sector
III. Water Governance and Policy
IV. Capacity building
V. Disaster Management viz., droughts, floods, landslides etc.
VI. Climate resilience
DISASTER MANAGEMENT IN KERALA

The prime objective is to ensure effective preparedness as well as mitigation from water related disasters

Strategies for achieving this
✓ To introduce an efficient flood and land slide protection system in the context of changing climate scenarios

Activities/ Action Plan
➢ Formulation of flood and associated landslide protection and rehabilitation master plans, employing both structural and non-structural measures
➢ Real time prediction systems along with forecast for disasters by preparing flood frequency forecasting risk maps
➢ Development of a preparatory process for protection and rehabilitation operations prior, during and after disasters
➢ Conducting training to all the stakeholders for protection and rehabilitation.
The prime objective is to ensure effective preparedness as well as mitigation from water related disasters

Strategies for achieving this

✓ Climate resilient agriculture and irrigation
✓ Weather prediction, Flood modelling, Early Warning etc.

Activities/ Action Plan

➢ Water-budget, Crop calendar, Water utilization calendar considering changing climate
➢ Real time prediction systems along with forecast for disasters
➢ Preparedness process
➢ Conducting training to all the stakeholders on climate resilient strategies
➢ Carbon Neutral/Climate resilient agriculture/villages
Disaster Management

- Water Budgeting, Allocation and Governance
- **River/River basin Management**
- Watershed management
- Wetland and Coastal zone management
- Crop water management/irrigation scheduling
- Reservoir operations
- Conjunctive use of surface and Groundwater
- Disaster management- Mitigation

Floods: Preparedness
Droughts: Response
Landslides: Rebuild
Water Budgeting

Supply
• Rainfall
• Surface Water
• Groundwater
• Import
• Export

Demand
• Domestic
• Agriculture
• Commercial
• Industrial

[Diagram with icons and illustrations related to water supply and demand]
Rainwater Harvesting

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Immediate water security measures (Short & Medium Term)

- Rain/Roof water harvesting, storage and controlled use (FC tanks, lined ponds etc.)
- Attitudinal and Behavioural Change (ABC) relating to water use & water literacy

A family of 4 will require in 1/3 period of a year 135x4x365=65,700 litres

Rural

Sustainable water security measures (Long Term Measures)

- Engineering measures leading to Groundwater Recharge
- Natural GWR Agronomic & vegetative measures

- Drainage line treatment

- Land Improvement Measures

Urban

Rain/Roof water harvested into Rain pits and Staggered Contour trenches

A house of 100 m² will generate 100*1.7*0.8= 136 m³ = 1,36,000 litres of water in a year (Av. annual rainfall of the region is 170 cm and runoff coeff. of tiled roof is 0.8)
Three options of rain water harvesting:

1. **Tank**
2. **Filter**
3. **First flush system**
4. **Gutter system**

Collection Surface
Lined pond for Rainwater harvesting
Community-based rainwater harvesting/groundwater recharging structures

- Check dams
- Percolation tanks
- Gabion structures
- Grassed waterways
- Diversion drains

Images:
- Dewas, Madhya Pradesh
- Lalatora, Madhya Pradesh
- Loose boulder check dam
- Vented Cross Bar
- Loose boulder check bund
WATERSHED MANAGEMENT
COMMUNITY FLOOD WATER MANAGEMENT

SDG-6, 11
Management of Rivers and Wetlands

Restoration Activities in Rivers and Wetlands

- De-silting
- De-weeding
- Embankment Protection

- National Wetland Inventory and Assessment (NWIA) Phase – II (Kerala and Lakshadweep)
Flood and water quality - Flood has negative impacts on the environment, economy and human health.
STEP 1

Roofwater Recharge Filter

STEP 2

STEP 3

STEP 4

STEP 5

STEP 6

STEP 7
Urban Floodwater Recharge Filter