

REPORT ON SECTORAL INPUT TRAINING FOR LSG DM PLAN COORDINATORS

2nd February 2021 to 9th February 2021

Organized by
Kerala State Disaster Management Authority
Govt. of Kerala



State Emergency Operations Centre (SEOC)
Kerala State Disaster Management Authority (KSDMA)
Observatory Hills, Vikas Bhavan P.O, Thiruvananthapuram, Kerala, India. Pin – 695033
Email: seoc.ksdma@kerala.gov.in
Tel/Fax: +91 (0) 471 – 2364424
Web: sdma.kerala.gov

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INTRODUCTION

Preparation of Disaster Management Plan by every Self Government Institutions is an important component of the Nammal Namukkayi campaign formulated in People's Planning mode. For this, every local self-government institution has prepared its disaster management plan, incorporating preparation steps and mitigation measures. And Approved by each District Disaster Management Authority and District Planning Offices

Local Self Governments of Kerala are now capable of starting plan implementation from the very beginning of financial years by preparing annual plans. Now the annual plan formulation Of 2020-21 is going on. Local self-government institutions are giving special thrust for the creation of a new Kerala in 2020-21.

So, this has become an important role for all LSGDM plan coordinators, to review, and upgrade the projects mentioned in the local self-government disaster management plans. Sectoral input sessions were planned in a way that will help to enhance the knowledge on sector-specific, which could easily connect with location-specific hazards, and give feedback to the LSGs to properly target, more effective, and creative. Better disaster resistance and resilience can be ensured. The sectoral input sessions were started on the 2nd of February and ended on the 9th of February; all the topics were immensely helpful for plan coordinators for an understanding, to get back to LSG's on preparatory and mitigation activities in detail.

TRAINING SCHEDULE

| Sl. No | Date and Time | Topic | Moderator | Resource Person |
|--------|------------------------------------|---|---|---|
| 1 | 02-02-2021 03.30 pm to 05.00 pm | Hydrology | Sriram A LSGDM Plan Coordinator, Trivandrum | Dhannu Dhanapalan Hydrologist, KSDMA |
| 2 | 03-02-2021 03.30 pm to 05.00 pm | Rural Development | Gauri N Gaush LSGDM Plan Coordinator, Kollam | Tinoj John Rural Development Specialist, KSDMA |
| 3 | 05-02-2021 03.30 pm to 05.00 pm | Agriculture | Sreenidhy Ramachandran LSGDM Plan Coordinator, Pathanamthitta | Dr. Aswathy S. Nair Agricultural Development Specialist, KSDMA |
| 4 | 08-02-2021 03.30 pm to 05.00 pm | Building safety and Urban Planning | Muhammed Shalik N, LSGDM Plan Coordinator, Alappuzha | Reshma T Vilasan Urban Planner, KSDMA Indu V Architect, KSDMA |
| 5 | 09-02-2021 12.00 pm to 01.30 pm | Safety Engineering | Ani Thomas Idiculla, LSGDM Plan Coordinator, Kottayam | Alen Abraham Safety Engineer, KSDMA |

TRAINING

DAY 1 - Hydrology

The Meeting started at 3.35 pm with the welcoming of Sriram A, LSGDM Plan Coordinator. In the session Mr. Dhannu Dhanapalan detailed on Dam break, Flood, and Drought as the major Hydrological Concern along with coastal intrusion in Kerala. And explained about Excessive pollution of freshwater sources, Eutrophication, Erosion & Deposition, and Water Transport Accidents, its causes, and mitigation measures. The session progressed by explaining Reasons for Floods, which includes Global Climate Scenario, Lack of accurate climate-related flood forecasting models, Lack of disaster preparedness in the wake of 2018 floods. And manmade factors

In the next phase, he explained Mitigation measures from Floods i.e., the multi-reservoir systems optimization problem requires defining a set of rules to recognize the water amount stored and released by the system constraints. River Flood Routing, in flood forecasting, hydrologists may want to know how a short burst of intense rain in an area upstream of a city will change as it reaches the city. And proper management of reservoirs and regulators

He also detailed Disaster prevention, Hazard assessment, Vulnerability assessment, Risk assessment. Protective engineering solutions and Disaster preparedness. He concluded the presentation with the following points; global climate change may cause the repetitive occurrence of floods, landslides, and cyclones repeatedly in our near future, disaster Preparedness, Disaster pre & post evaluation is of prior importance to reduce future impacts, All government and allied agencies, their data and resource person can be used to bring out an efficient flood forecasting and decision-making model, Lives and property of many can be saved by proper planning and execution of good mitigation strategy. The session also tried to project the LSG DM Plan from a Hydrological perspective and gave few project suggestions.

DAY 2 - Rural Development

Gauri N Gosh, DM Plan Coordinator-Kollam, started the meeting at 3.30 pm by welcoming everyone to the session. She invited Tinoj John, Rural Development specialist from KSDMA to handle the session on the topic – Rural Development.

Tinoj started the session with a quote by M K Gandhi - “The soul of India lives in its villages”- and explained the idea behind the quote. The session progressed by looking at the importance of Rural Development and the various dimensions. Explained the need to evaluate projects based on the output it has generated. Some of the major economic indicators of Rural Development include – Agricultural production, economics, Education, Health, Infrastructure, Transportation, and Social Participation.

Tinoj tried to connect the relation between DRR and Rural Development, and how Rural Development can be viewed through a DRR perspective. He stressed the importance to include DRR measures in Rural Development practices in-order to shape a disaster-resilient rural community. As observed by him, climate change, change in land use pattern, and unsustainable agricultural practices are all contributing to the vulnerabilities of the rural population, increasing their chances of getting affected by a disaster. He opined to build a safety net that would buffer the effect of a disaster, leaving more space for the people to bounce back. Such an approach requires the utilization of existing local resources, sharing past experiences and observations, and involving rural youth and skilled professionals in DRR activities. Tinoj also mentioned social tourism as a means of income generation for the rural communities, it is sustainable as compared to traditional tourism practices and it also helps to build awareness in people about the need to protect environmentally sensitive areas. While concluding the session, He discussed the projects that could be included in the LSG DM Plan. The session ended with a brief Q&A, the participants were able to clear their doubts and share their views on the topic. Joe John George, State project officer, KSDMA, shared a few points related to the LSG DM plan and Rural Development as a reply to Muhammed Shalik's question. Gauri concluded the session at 5 pm by delivering a vote of thanks.

DAY 3 - Agriculture

The Meeting started at 3.30 pm with the welcome address of Mrs. Sreenidhy Ramachandran, LSG-DM Plan Coordinator, Pathanamthitta District. She moderated the session and invited Dr. Aswathy S. Nair to handle the session on the topic "Agricultural View on drought and flood" with help of a PowerPoint Presentation.

The session was fully focused on the drought, types of drought as well as mitigation measures to tackle the drought. The scope for including the agricultural aspects in the disaster management plan of local self-governments was also discussed in the session. Drought is one of the most dangerous phenomena that adversely affected the agrarian sector over some time. The types of drought listed in the presentation were, Agricultural Drought, Meteorological Drought, and Hydrological Drought. The host shared the guidelines on managing drought published by National Disaster Management Authority (NDMA) during the session. The adverse effect of drought on agriculture was listed as an increased fire hazard, increased risks of land degradation, livestock and wildlife death, etc which has the obvious potential to reduce the crop yield. Decentralized participatory planning and implementation of projects and programmes for the sustainability of natural resources for environment protection was suggested. The need for modern and scientific agricultural practice among farmers to reduce the risk of drought and land degradation has also come into discussion in the training programme. The history of present intensive agriculture was discussed briefly in the session in chronological order to understand soil as a buffer system. The indicators of drought were detailed in the session. The presentation ended with a discussion on mitigation plans to resist

the drought through soil conservation mechanisms. The question-and-answer session was very fruitful to clarify the doubts regarding the topic. Mr. Dhanu Dhanapalan, the hydrologist actively took part in the discussion with the addition of hydrological aspects. Dr. Aswathy S. Nair clarified the doubts of the attendees regarding drought-related agrarian problems. The focus of the session was limited to drought and its various aspects. Mr. Joe John George, State Project Officer, KSDMA managed the rush of comments regarding the session. Mrs. Sreenidhy Ramachandran delivered the vote of thanks at the end.

DAY 4 - Building safety and Urban Planning

The meeting started at 3.30 pm. Muhammed Shalik gave the welcome address. Due to the network issue from the moderator, Joe sir permitted to start the session and he invited the presenters to carry on the topic “Building safety and urban planning”

The first part of the session was handled by Reshma T Vilasan, Urban planner On the topic “Risk sensitive urban planning”. She started by talking about some basic concepts of disaster management. Followed by the different terminology in disaster management like Hazard, Vulnerability, Mitigation, Preparedness, and Response, etc. Then pictorial depiction of the disaster management cycle was shown, Hazard risk vulnerability analysis and the steps to undertake while doing HRVA were briefly discussed, the core of the session was about the Risk sensitive planning. That 10 steps in risk-sensitive planning include; Comprehensive assessment of hazard, risk, vulnerability, and capacity, Application of planning law and regulation for addressing risks, Development of base maps to mark risk areas, Participatory approach to address local concerns, Revision of existing development plans, Formulation of the project that incorporates the risk-sensitive component, Public awareness for the increased knowledge base, Capacity buildings for planning as well as implementation, Focus on needs of children, women, elderly and differently-abled people, Addressing budget requirements for risk-sensitive planning

She also mentioned how to design the LSG DM plans with comprehensive risk-sensitive planning techniques. The session was also tried to focus on the environment planning, out of infrastructures designing like physical social and economic and social infrastructures. Also, the need for green buildings. The pictorial depiction of the Instruments for the implementation of disaster risk reduction was shown in the presentation. And Gave a brief idea about the steps involved in the city disaster management plan like land-use planning for disaster risk reduction, urban risk factors with the help of some pictorial depiction of infrastructures from different cities.

Reshma T Vilasan stated that disaster management is the practice of collaboration of various line departments and said that without the coordination of these departments, proper disaster mitigation management measures cannot be done. She ended up her side of the session by pointing some key strategies for risk-sensitive urban land use planning and conveyed the

gratitude with a message of “Disaster Risk Reduction cannot prevent the occurrence of hazards but can reduce the impacts of hazards...”

The second part of the session was handled by Indu V, Architect SDMA. Mr. Muhammed Shalik invited her to present on the topic “Building safety and LSG DM plans”.

Indu V began the session by giving a clear-cut idea about what she is going to present with a pictorial depiction of the following heads. She mainly concentrated on 3 sectors which are;

- Multi-hazard resilient construction
- Retrofitting
- Building safety in LSG DM plans.

She started by explaining about multi-hazard resilient building, which has been already discussed before during the training session. So, she went through the recap of the previous information. She pointed out the concepts of hazard resilient structure and stated that “the hazard resilient is not hazard proof, it only saves lives and minimize the damage”. She tried to talk from the perspective of LSG DM plans and how to incorporate these resilient structures ideas with LSG DM plans like where to build, what to build with, how to build etc. with the help of some pictures in her presentation.

Then comes to the area of Retrofitting for disaster risk reduction, started with the basics of retrofitting and why it is performed and the disaster perspective on the importance of retrofitting in the critical lifeline structures like hospitals, schools, community halls, etc. and also mentioned the different steps involved before doing retrofitting practices like; What are the threats, which building to retrofit, Rapid visual analysis, how to retrofit, Gathering resources. And concluded the topic “Building safety in DM plans” Which is the most understood and relevant section in DM plans, and shared her vision and some of the suggestions to be added and to modify the LSG DM plans. what are the changes that should come in chapters 4 and 6 of the LSG DM plans and added some points to improve both structural and non-structural mitigation, strength, and weakness in the area? When it comes to chapter 6, she said that the mapping of vulnerable households and settlements at the root level will makes the LSG DM plan to the next level and useful for future mitigation works. Some of the suggestions including RVS detailed assessment and retrofitting of a selected few critical lifeline building as a pilot project. The presentation ended up by giving all these ideas in a nutshell. Then Muhammed Shalikh handled the final Q&A session and requested all the participants to shoot the specific subject-oriented questions/doubts and it was a little bit lengthy session because of the two orators but the Q&A session went well and the meeting ended up by a vote of thanks of Mr. Muhammed Shalik.

DAY 5 - Safety Engineering

The Meeting started at 12.05 pm with the welcome address of Mr. Ani Thomas Idiculla, LSG-DM Plan Coordinator, Kottayam District. He moderated the session and invited Mr. Alen Abraham to handle the session. Alen Abraham presented on the topic “Safety Engineering “with help of a PowerPoint presentation. The session was focused on manmade disasters. He explained two fundamental theories - Birds Pyramid Theory; the relationship between serious accidents, minor accidents, and near misses, and proposes that if the number of minor accidents is reduced then there will be a corresponding fall in the number of serious accidents. Dominos Theory; All accidents, whether in a residence or a workplace environment, are the result of a chain of events. 6 steps of control measures explained as to eliminate, substitute, isolate, engineer controls, administrative controls, and PPE.

He explained different types of industrial fire as; Pool fire-fire on a stationary liquid surface, such as that of a pool of liquid hydrocarbon. Jet fire-when a hydrocarbon release from a pressurized source is ignited close to the source of the release. Flash fire-is a sheet of flame that moves through a cloud of gaseous or vaporized hydrocarbons, without any accompanying shock-wave. And discussed two types of explosions BLEVE and UVCE. Petrochemical transportation accidents mainly happened to LPG tankers, public gatherings, and fireworks (Puttingal tragedy), hazardous materials-(HAZMAT) can include explosives, flammable and combustible substances, poisons, and radioactive materials. Crash blackspots etc. are the main topics covered in the presentation. He concluded the presentation with certain suggestions, DM plans should be location-specific, learn from events and consider a database of previous events to prioritise the risk and identify the worst-case scenario at a location. The question-and-answer session was very fruitful to clarify the doubts regarding the topic. Mr. Alan clarified the doubts of the attendees regarding the categorization of fire accidents, possible methods to prevent biological waste dumps, etc. Ms. Reshma V added her points on the classification of disasters. Mr. Joe John George, State Project Officer, KSDMA added his note on disasters and DM plans of LSGs. The focus of the session was limited to the prevention of fire accidents only. Mr. Joe John George, State Project Officer, KSDMA delivered the vote of thanks at the end.

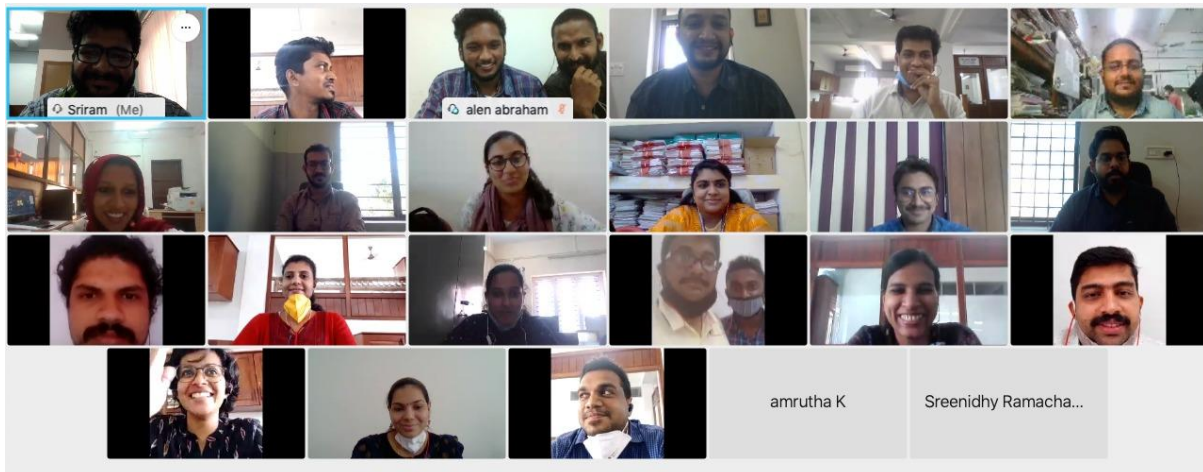
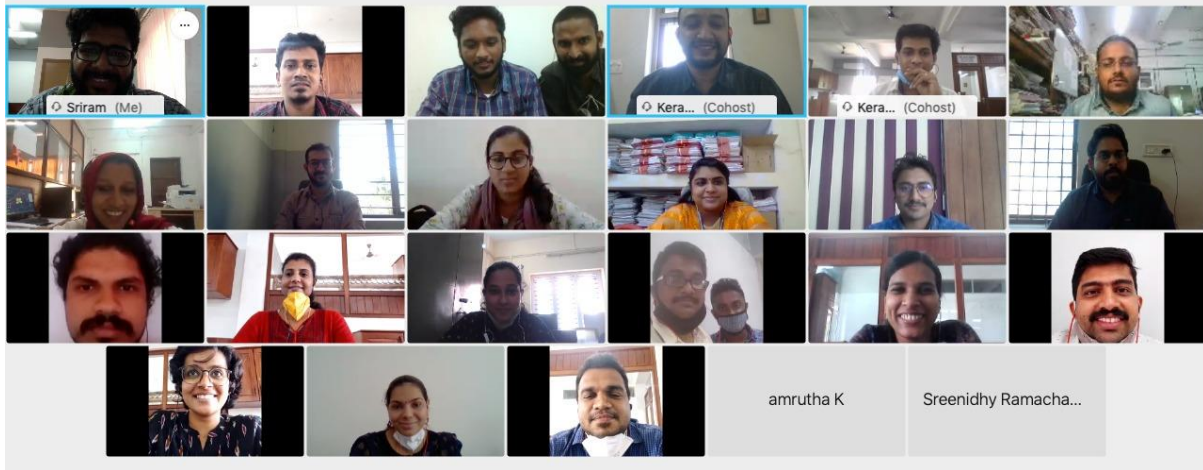
CONCLUSION

The whole sessions were highly motive and sharpened the knowledge on hydrology, agriculture, urban safety, and rural development, which could help LSGDM plan coordinators to get back to the local government, and assist on their disaster management plans, it will ensure all the DM plans will have all the sector-specific components.

The sessions were followed by a feedback form, which is attached herewith. https://docs.google.com/forms/d/e/1FAIpQLSczvzBJ21dVUkmatXZc2m3OgZfcnPsY_zv44k44TJikPu1cUA/viewform?usp=sf_link

ANNEXURES

PHOTOS FROM THE SESSION



ATTENDEES

- Mr. Joe John George, State Project Officer, KSDMA.
- Mr. Dhannu Dhanapalan, Hydrologist, RKI Project, KSDMA
- Mr. Tinoj John, Rural Development Specialist, RKI project, KSDMA
- Dr. Aswathy Nair, Agricultural Expert, RKI project, KSDMA
- Ms. Reshma Vilasan, Urban Planner, RKI project, KSDMA
- Ms. Indu V, Architect, RKI Project, KSDMA
- Mr. Alen Abraham, RKI Project, KSDMA

- Mr.Mrudu Krishna, Field Assistant, KSDMA
- Mr.Vignesh K R, Environment Planner, KSDMA
- LSG-DM plan Coordinators

Mr. Sriram A, Thiruvananthapuram
 Ms. Gauri N Ghosh, Kollam
 Ms. Sreenidhi Ramachandran, Pathanamthitta
 Mr. Muhammed Shalikh, Alappuzha
 Mr. Ani Thomas Idiculla, Kottayam
 Mr. Ashhar Jabbar, Idukki
 Ms. Aiswarya S, Ernakulam
 Ms. Noushaba Nas, Thrissur
 Ms. Asha V K Menon, Palakkad
 Ms. Stephy Rajan M, Malappuram
 Mr. Dev Anand, Kozhikode
 Mr. Basil P V, Wayanad
 Mr. Ashwin Madhanshekhar, Kannur
 Mr. Ahemed Shafeeq P, Kasargod

PRESENTATIONS

DAY 1 – PPT



Technical
 Presentation for
 District Co-
 Ordinators for
 DM Review

PRESENTED BY:
 DHANNU DHANAPALAN
 HYDROLOGIST, KSDMA



Overview

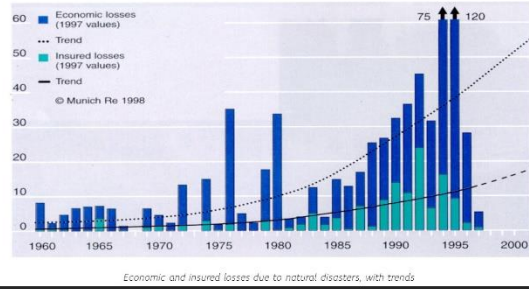
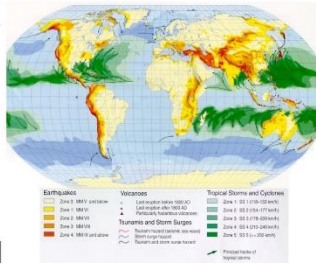
- Introduction
- Review for Preparedness, Adaptive Measures, Mitigation Strategies
- Conclusion

Introduction

- ❖ DAM BREAK FLOODS & DROUGHTS is the major Hydrological Concern along with COASTAL INTRUSION
- ❖ Similar concerns are, EXCESSIVE POLLUTION of fresh water sources, Eutrophication, Erosion & Deposition, Water Transport Accidents
- ❖ The 2018 floods awakened in the increased need of flood studies and flood mitigation strategies.
- ❖ The great flood of 1924 may be considered as the worst flood till date, in technical terms it might be considered as the Design Flood (Q_{100}). 3,368 mm of rain in a monsoon, which is 64% than the normal.

Reasons For Floods

1) Global Climate Scenario



Reasons For Floods

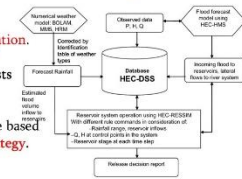
1) Global Climate Scenario

- ❖ La Niña & Southern Climatic Cycle has given rise to **Extreme Rainfall Events (ERE)**.
- ❖ **ERE**: The rainfall accumulated in 24 h in the range **64.5–124.4 mm** is termed as heavy rainfall, and extremely heavy rainfalls lie in the range **124.5–244.4 mm**

Reasons For Floods(contd.)

2) Lack of accurate climate related flood forecasting models.

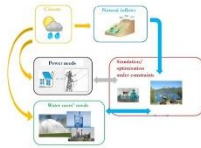
- A good climate based flood forecasting model aids to better evacuation and mitigation.
- Unscientific flood water level prediction costs lives and property.
- Every developed society has a good climate based flood forecasting model and mitigation strategy.



Reasons For Floods (contd.)

3) Mismanagement of Reservoirs and regulators

- Most of our reservoirs are multi-purpose reservoirs, i.e. **power generation, irrigation, municipal needs, tourism and flood protection**.
- Dam scheduling and spillway regulation, spillway operational manual should be **strictly followed**.
- All dams and regulators and cross drainage structures should have a vigilant authority with knowledge in **Emergency action plans and strategies** should be made aware to all dam and reservoir in-charges.



Reasons For Floods(contd.)

4) Lack of disaster preparedness in the wake of 2018 floods.

- A good policy making, decision making keeping the aspect of hydrological and ecological impacts and engineering skills was lacked during 2018 floods.
- Valid points from **Gadgil committee report, Kasturi Rangan Report and Swaminathan Committee reports** should be enforced.
- **Irrigation and KSEB divisions** should do their part on flood management. Engineers and officials should be more vigilant and trained for flood management.
- **RTDAS, SCADA, DDMS** for dams should be made reality as per **Indian Spillway Operation Manual**
- Learn from developed countries like **Netherlands** (similar situ of Kuttanad), **Brazil, Amazonian countries**.

Reasons For Floods(contd.)

5) Man made factors

- **Overpopulation and over exploitation of resources**
- **Mining and Quarrying**
- **Improper construction and illegal encroachments** disrupting downstream flow.
- **Common drains and hydraulic infrastructure** for storm water and sewerage in cities and towns
- **Construction on hilly and vulnerable areas**
- **Lack of proper bank protection**
- **Disrupting natural flow of rivers** by various means.

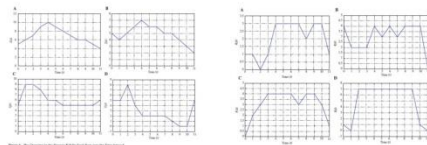
Mitigation From Floods

1) Multiple-Reservoir Scheduling Using β -Hill Climbing Algorithm

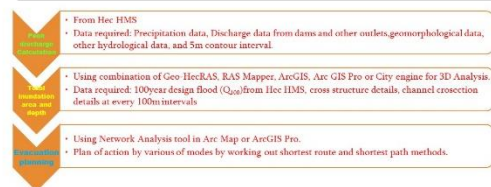
- The multi-reservoir systems optimization problem requires defining a set of rules to recognize the **water amount stored and released** in accordance with the **system constraints**.

Mitigation From Floods(contd.)

1) Multiple-Reservoir Scheduling Using β -Hill Climbing Algorithm



Research Proposal for Climate based flood inundation forecasting



Mitigations from Floods (contd.)

3) River Flood Routing

- Routing is a technique used to predict the **changes in shape of a hydrograph as water moves through a river channel or a reservoir.**
- In flood forecasting, hydrologists may want to know how a **short burst of intense rain in an area upstream** of a city will change as it reaches the city.
- Flood routing is a procedure to determine the **time and magnitude of flow** (i.e., the flow hydrograph) at a point on a watercourse from known or assumed hydrographs at one or more points upstream.
- The hydrologic models need to estimate **hydrologic parameters using recorded data in both upstream and downstream sections** of rivers and by applying robust optimization techniques like One Dimensional Saint Venants Equation

Mitigations from Floods (contd.)

2) Proper management of Reservoirs and regulators

- **Dam scheduling and spillway regulation**, Indian spillway operational manual should be **strictly followed.**
- All dams and regulators and cross drainage structures should have a vigilant authority with knowledge in **Emergency action plans and strategies.**
- All safety procedures and periodic checks should be followed by those assigned duties for.

Mitigations from Floods (contd.)

4) Better Administrative and decision making

- A well defined disaster management policy for the state encompassing each **type of disaster, its preparedness, and its mitigation** should be enforced.
- Efficient water resource management at domestic household to reservoir level shall be done.
- Stormwater drains and Sewerage drains shall be made separate wherever possible.
- **Swaminathan Commission** report's Kasturirangan Commission and **Gadgil Committee** report's valid points shall be applied to Kuttanad
- An **Interactive GIS based Evacuation- Flood- Climate model** should be made possible by unified data-sharing of Govt agencies and their resource personnel.
- **Climate Resilient construction** techniques needs to be adopted.

Disaster prevention is the planned reduction of risk to human health and safety.

This may involve modifying the causes or consequences of the hazard, the vulnerability of population or the distribution of the losses.

The following activities form part of hazard mitigation:

- **Hazard assessment:** determining the type of hazardous phenomena that may affect the area, their frequency and magnitude, and representing on a map which areas are likely to be affected;
- **Vulnerability assessment:** assessing the degree of loss that these events will cause to population, buildings, infrastructure, economic activities, etc.
- **Risk assessment:** quantifying the numbers of lives likely to be lost, the number of persons injured, the cost of damage to property and disruption of economic activities caused by the events, and preparation of maps indicating the risk areas.

Restrictive zoning: implementation of the risk maps in development plans, and development of laws to enforce these plans. Public acquisitions of hazardous areas; removal of unsafe structures; obligatory informing potential buyers of real estate on hazardness of the site; include hazardness in insurance policies of real estate.

Protective engineering solutions the construction of engineering works to protect the elements at risk from a potentially disastrous event. For example: dikes, floodwalls, slope stabilisation works, erosion control works, cyclone shelters etc.

Building codes: the definition of standards for the construction of buildings and infrastructure, so that are able to withstand a disastrous event of a certain magnitude/intensity. For example: earthquake resistant building codes or the construction of houses on poles in frequently flooded areas.

Informing population: public information and education on hazards and risks in the area.

Disaster preparedness: all those activities that are intended to be prepared once a disastrous event is going to happen, so that people can be evacuated, protected or rescued as soon as possible. It involves the following activities

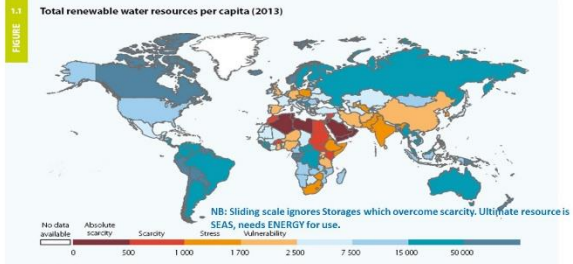
- **Preparation of a disaster plan:** co-ordination with all emergency services, governmental organisations and the public. Establishing an organisation for emergency operations.
- **Anticipating damage to critical facilities:** construction of a number of disaster scenarios, in which damage to critical facilities (main roads, hospitals, buildings of emergency organisations, etc.) is anticipated, and the consequences evaluated.

Review for Preparedness

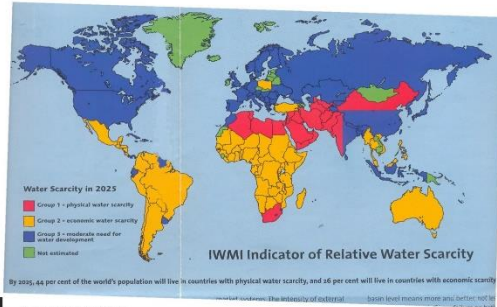
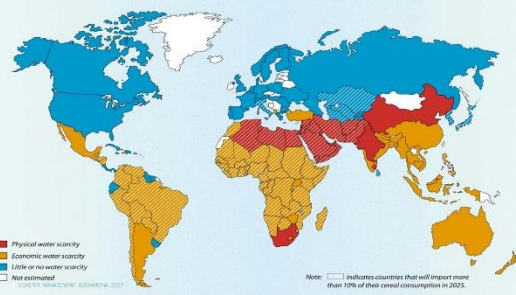
DAM BREAK



MULLAPERIYAR DAM



Projected Water Scarcity in 2025



Conclusion

1. The global climate change may cause repetitive occurrence of floods, landslides and cyclones repeatedly in our near future.
2. Disaster Preparedness, Disaster pre & post evaluation is of prior importance to reduce future impacts
3. All government and allied agencies, their data and resource personnel can be used to bring out an efficient flood forecasting and decision making model.
4. LIVES AND PROPERTY OF MANY CAN BE SAVED BY PROPER PLANNING AND EXECUTION OF GOOD MITIGATION STRATEGY



Sectoral Input Session– Day 2

RURAL DEVELOPMENT

RURAL DEVELOPMENT

- › India Lives in its village– Mahatma Gandhi
- › RD– Is a comprehensive term
- › Process of Improving quality of life and economic well being
- › According to 2011 census 68.84% are lives in villages

Dimensions–

- › Economic, social and political
- › Inclusive rural development
Women, Tribal, Differently abled,
plantation workers etc.

Indicators

- › Agricultural Production
- › Economic
- › Education
- › Health
- › Infrastructure
- › Transportation
- › Social Participation

DISASTER RISK REDUCTION AND RURAL DEVELOPMENT

- › Possibility of New Rural– Disaster Resilient
- › Climate Change
- › Land use
- › Agricultural Activities
- › Utilization of Local resources
- › Past experience and other observations
- › Rural Youth and Skilled professionals
- › Recognition of stakeholder participation
- › Social tourism

LSG DM PLAN in RD Perspective

- › Chapter wise analysis
- › People's participation
- › Emergency response teams
- › Considerable Projects suggested (coastal areas, forest areas, involvement of MGNREG etc)

DAY 3 – PPT

AGRICULTURAL VIEW ON DROUGHT AND FLOOD

Dr. ASWATHY.S.NAJR

DROUGHT – SLOW ON SET

- Drought is more and more a dangerous phenomenon in agricultural land.
- Precipitation is the largest single determinant of drought.
- Temperature and other climate elements are also important.
- It is not uncommon for drought periods to be accompanied by higher summer temperatures.
- Often, people do not react to drought like they do to other sudden disaster such as earth quakes, cyclones and floods.
- Drought condition develops over a period of time and without immediately perceptible changes to environment.

TYPES OF DROUGHT

• **Agricultural drought** : Are the droughts that affect crop production or the ecology of the range.

• **Meteorological drought**- Is brought about when there is a prolonged period with less than average precipitation

Hydrological drought : Is when the water reserves available in sources fall below the statistical average

DROUGHT AND AGRICULTURE

- Reduced crop, rangeland, and forest productivity
- Reduced water levels
- Increased fire hazard
- Reduced energy production
- Reduced opportunities and income for recreation and tourism
- Increased livestock and wildlife death rates
- Increased risks of land degradation
- Damage to wildlife, forests and fish habitat

THE DROUGHT POLICY APPROACH - INHERENT CHARACTERISTICS

- Integration, through joint planning by the concerned sectors
- Decentralization as well as participatory planning and implementation
- Synergy between the long-term development and the short-term emergency response to drought
- Prioritization of mitigation and response measures
- Timed, location-specific short and medium-term actions and measures, before during and after drought
- Adaptation to climate change through resilience building
- **Sustainability of natural resources and environmental protection**
- Building on what exists using relevant tools and practices already in place for the different sub-sectors (crops, land, water, animal production, fisheries, forestry, etc.

SOIL AS A BUFFER SYSTEM

- Soil is one of the most important water storage in nature.
- It means that water content in the soil is very significant parameter which significantly depends on quality of soil.
- During the last few decades, intensive agricultural practices decrease water infiltration intensifies into the soil profile and lower water accumulation by soil profile compaction.
- Drought and flood potentials increase due to soil compaction, it is necessary to mitigate by soil quality improvements implement in the agricultural practices.

SOIL AS A BUFFER SYSTEM

- Nomad nature of man
- Settled agriculture
- water is "blue gold" for nature and society
- "Fighting for water saving and against water threats" should be fundamental practice of agriculture to fight against disaster.
- Regulation of soil water regimes is well known in agriculture
- "Intensive agriculture"
- Brought new progressive and effective practices in agriculture but simultaneously led to soil degradation as well.

INDICATORS

- Patchiness or absence of vegetation
- Weedy vegetation
- Rill and sheet erosion
- Surface crusts
- Hard-setting surfaces
- Pale surface soil colour and absence of organic matter
- Cloddiness
- Restricted root growth

INDICATORS

- Soil compaction as physical degradation of soil was observed
- Crusting of soil
- Sub soil hardening
- Reduction in water logged area
- This amount of water is affecting not only by conditions for plant cover of soil, but represents the portion of rainfall water which can be saved by soil and territory for many kinds of functions in nature

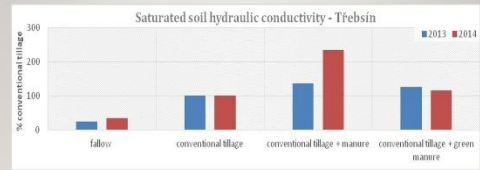
HOW TO MANAGE

- Increased awareness of the problems associated with soil compaction and subsoil compaction
- Subsoiling (higher energy input and it was not effective for a long period)
- New knowledge about it brought new ideas
- Adoption of minimal tillage
- Zero tillage
- Strip tillage
- Conservation tillage (Min 30% area should be left residual)
- Organic farming (Crop rotations, cover crops, manuring, residue mulch, and compost)
- Conserving wetlands

TABLE 1. SOIL MOISTURES (IN %) BEFORE AND AFTER INFILTRATION EXPERIMENTS

| Depth in cm | Before infiltration | | After infiltration | |
|-------------|---------------------|--------------|--------------------|--------------|
| | Subsoiled | No subsoiled | Subsoiled | No subsoiled |
| 0-15 | 15.98 | 15.11 | 29.78 | 25.07 |
| 15-30 | 17.42 | 17.88 | 20.52 | 19.87 |
| 30-45 | 17.49 | 18.71 | 20.81 | 19.44 |
| 45-60 | 18.98 | 17.98 | 19.42 | 19.01 |
| 60-75 | 19.7 | 18.9 | 19.48 | 18 |

FIG.1 RESULTS FOR WATER HOLDING CAPACITY FOR DIFFERENT TYPE SOIL CULTIVATION AT THE SITE OUBENICE, PRACHIOV AND TREBSIN



HOW TO FACE

- Alternate crops
- Alternate variety
- Promote short duration variety
- Promote less water intensive crops
- Advocate crop diversification, mixed cropping of main crop with drought tolerant companion crops
- Thinning of plant population
- Drip irrigation

CONTD..

- Build a water storage system
- Store water in ditches along fields.
- Install water measurement devices that keep track of water use.
- Use water from deep aquifers instead of surface water

TABLE.2 CROP CONTINGENCY PLAN

| Crop affected due to inadequate rains | Alternate crops |
|---------------------------------------|-----------------------------------|
| Paddy | Gram, pulses, oilseeds and fodder |
| Maize | Pulses and oilseed |
| Cotton | Soyabean and pulses |
| Sugarcane | Pulses and fodder |

FLOOD

- Floods may vary in intensity and duration, from a few hours to a period of months, and may also at times be forceful and unpredictable.
- Improving water distribution, by putting in place water control structures, can allow better control of water and reduce erosion, water logging and other risks.
- Dikes and soil bunds
- Drainage ditches
- Improving water infiltration
- Contour bunding
- Multi functional use



AGRICULTURAL IMPACTS

- Loss of standing crops
- Impact on stored seeds, tools and facilities is significant.
- Fertilizers are usually not stored therefore losses of fertilizer were lower compared to seeds.
- Seed losses will affect both the winter and summer season starting in October and January respectively, as well as the next monsoon season beginning .
- Coping mechanisms such as borrowing money from the informal market and purchase on credit will be employed to replace lost assets, leading to a likely increase in debt.

AGRICULTURAL IMPACTS

- Damage to irrigation systems and infrastructure was reported in most areas assessed.
- Irrigation schemes need to be rehabilitated in time for the summer season starting in January which mainly relies on irrigation.
- Seasonal agricultural labour is considered one of the most important sources of income for poor households including female-headed households.
- The impact caused by the flood significantly reduced seasonal job opportunities in the agriculture sector and these are expected to decrease even further during the upcoming monsoon harvesting season and the following winter season.
- Resulting reductions in yield will impact on income generation for all farmers

SOURCES

- Indian Metrological Department (IMD website)
- Kerala State Disaster Management Authority (Website)
- Kerala Agriculture Department (Website)
- India.gov.in

DAY 4 – PPT

Sectoral Input Session for LSG DM Plan Coordinators Day 4

Risk Sensitive Urban Planning & Building Safety

Reshma T Vilasan
Urban Planner
RKI, KSDMA

Hazard Risk Vulnerability Analysis

To mitigate disaster-related risks....

Understand the relationship between hazards and vulnerabilities in any given area

- Preparation of hazard and exposure database
- Mapping vulnerable population
- Understanding building vulnerability
- Exposure database
- Risk Assessment
- Risk reduction measures

Steps to undertake Hazard Risk and Vulnerability Analysis

1. Preparation of hazard and exposure database

2. Mapping vulnerable population

3. Understanding building vulnerability

4. Exposure database

5. Risk Assessment

6. Risk reduction measures

Basic Concepts of Disaster Management

$$\text{Hazard} \times \text{Vulnerability/Capacity} = \text{Risk at a place}$$

Ensure inclusion of all phases in a DM cycle
The four DM phases illustrated below do not always, or even generally, occur in isolation or in this precise order. Often, phases of the cycle overlap and the length of each phase greatly depends on the severity of the disaster.

- Mitigation** - Minimizing the effects of disaster
Examples: Building codes and zoning, vulnerability analyses and public education.
- Preparedness** - Planning how to respond
Examples: Preparedness plans, emergency exercises/training and warning systems.
- Response** - Efforts to minimize the hazards created by a disaster
Examples: Search and rescue and emergency relief.
- Recovery** - Returning the community to normal.
Examples: Temporary housing, grants and medical care.



Risk Sensitive Planning

Mainstreaming disaster risk management within the governance and operations of public and private institutions, particularly in spatial and physical development plans.

Risk Sensitive Urban Planning - Basic steps Case

10 Step Risk Sensitive Urban Planning

1. Assessment of hazard, risk, vulnerability and capacity
2. Identification of priority areas for risk reduction
3. Identification of key stakeholders and their roles
4. Designing safer infrastructure
5. Implementation of risk reduction measures
6. Monitoring and evaluation
7. Capacity building for DRR
8. Ensuring safety and functionality of critical infrastructure and evacuation points
9. Incentives for safety features and retrofitting
10. Improving public awareness

Management of priority areas for risk reduction

1. Identification of priority areas for risk reduction
2. Identification of key stakeholders and their roles
3. Identification of key stakeholders and their roles
4. Designing safer infrastructure
5. Implementation of risk reduction measures
6. Monitoring and evaluation
7. Capacity building for DRR
8. Ensuring safety and functionality of critical infrastructure and evacuation points
9. Incentives for safety features and retrofitting
10. Improving public awareness

1. Environmental planning

- Identify natural features such as drainage channels and water bodies that need to be protected
- Identify high risk zones where population and investment concentration is to be avoided
- Use suitability analysis to match best land parcels for specific uses
- Identify carrying capacity of natural and built systems, and plan populations and activities accordingly
- Use participatory assessment and planning for multi layered GIS analysis across themes

2. Improving the preparedness of cities to respond to shocks and stresses

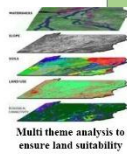
- Shocks: Rapid onset disasters with low probability but high impact. Example: Earthquakes.
- Stresses: Slow onset disasters with high probability yet low impact. Example: Water stress or water logging, leading to disease

3. Designing safer and greener buildings

Safety and sustainability needs to be ensured in buildings made of varying materials, catering to different income groups and functions.

Towards this:

- Create a building inventory of the city and keep it updated in real time
- Publicise in simple terms the key aspects of safe construction for new buildings, and maintaining and retrofitting for existing ones
- Strengthen training, certification and monitoring of architects, engineers, construction contractors, and masons
- Identify low income areas with non-engineered buildings, and apply Mandatory Rules of Thumb
- Encourage green buildings with water harvesting, solar-passive design, solar photovoltaic energy, waste management and landscaping.



4. Designing safer infrastructure

Infrastructure is one of the key elements for the smooth operation and survival of a city. The infrastructure itself needs to be safe for citizens and must be resilient to disasters.

- Physical Infrastructure:** Ensure that the design of housing, roads, airports, ports, electricity network, sewerage, water supply, public and commercial buildings, and public utilities are assessed for their exposure to disaster risks due to their location, quality of construction and maintenance.

Follow up with risk reduction measures through planning and retrofitting.

- Social Infrastructure:** Ensure that the schools, health facilities, and community spaces are assessed for their risk exposure, and appropriate mitigation and preparedness plans are put in place.
- Economic and Institutional Infrastructure:** Banks, financial institutions, administrative establishments and emergency services are lifelines for the city, and need to be assessed for risk and their safety ensured through planning and retrofitting interventions.

Hazard Resistance in Buildings

Multi-Stakeholder Engagement

Role of technology

Transformation of Surat – From Plague to Second Cleanest City in India

- The plague claimed 46 lives
- Narrow streets, dense settlements and poor drainage systems
- The Surat local authority and the municipal commissioner

Surat is seen as one of India's cleanest cities

Instruments for Implementation of Disaster Risk Reduction

Instruments for Implementation of Disaster Risk Reduction

- Development control regulations and bylaws
- Multi-level planning
- Expansion & Maintenance of buildings
- Structural design
- Supervision and quality control

Instruments for Implementation of Disaster Risk Reduction

- Improving Public Awareness
- Engagement of local stakeholders through participatory process
- Incentives for safety features and retrofitting
- Risk informed planning and budgeting
- Capacity building for DRR
- Ensuring safety and functionality of critical infrastructure and evacuation points

Role of Urban Managers

Urban local bodies need to play a major role in the disaster preparedness planning. Major roles of the urban local bodies before and after a disaster are:

- Preparation and updating of DM plans
- Participation and coordination in response activities
- Conducting activities such as damage assessment and relief distribution for recovery from the event



Land Use Planning for Disaster Risk Reduction Urban Risk Factors

- Unplanned development pattern and uncontrolled urban sprawl making it difficult to manage the megacity even during normal times.
- Hazardous industrial plants existing with congested informal settlements
- Informal construction made up of substandard materials
- A built environment susceptible to natural hazards resulting from unregulated building practices
- Historical buildings that are not restored or properly secured for hazards



Vulnerability of urban regions to disaster is intensified by:

- Physical densification of settlements
- High concentration of business investments and economic assets
- Convergence of vital networks, along with critical facilities and transportation

Key strategies for Risk – Sensitive Urban Land Use planning

| Planning tool | Specific measure | Disaster risk reduction | Incidental benefit |
|-------------------------|--|---|---|
| Zoning | Identify vulnerable areas within a region, draw zones to flood, cyclone, settlement of soil etc. Keep a check on density – strict vigilance is required on habitable areas allowed and actual built-up areas (limits on building height if necessary) Control or prohibit development in over developed areas - declare as Development Control Zone Encourage a mix of land use to have a mix of distribution of population at all places at any point of time Provide adequate open space which can be used as refuge areas like an open space during earthquakes, or closed shelters during a flood. | Reduction of damage to property Minimize life loss due to building collapse Reduction of damage to property Minimize life loss due to building collapse Reduction in loss of life Fast rescue of casualties/quick relief | Some open spaces are preserved as infrastructure Creation of a more livable neighbourhood Habitat of land use with efficient transportation More open spaces for community enjoyment A well managed flow of traffic in normal times A well planned land use setting to daily needs Some regional prosperity |
| Land use Planning | Provide adequate space which can be used as refuge areas like an open space during earthquakes, or closed shelters during a flood. Ensure strategic placement of essential physical infrastructure like hospitals to come to the rescue at various locations post disaster. Strengthen connectivity with neighbouring regions from where aids will be received post disaster. | Fast rescue of casualties/quick relief Create a chance of life saving Aval stock supplies and material aid | Some regional prosperity Some open spaces are preserved as infrastructure Creation of a more livable neighbourhood Habitat of land use with efficient transportation More open spaces for community enjoyment |
| Infrastructure Planning | Stabilization of river bank slopes and redevelopment of riverways. Provide / increase safe walks in congested areas. Construction of a good drainage network system | Reduction of loss of life and property Less evacuation Reduction in flooding Facilitate recovery | Some can be used as co-activity with neighbouring areas post disaster Health improvement Reduce water logging Reduce health risk. Better environment Some quality of life |
| Building regulation | Construction of a sewer system for laying electrical or TV cables. Local authorities to enforce that all new and existing buildings meant for public use and high rise residential buildings must consider seismic safety in the design. | Easy to call for relief Minimize the loss of life due to building collapse Reduction of need for evacuation during disasters Reduction of risk of building. | Some regional prosperity A more decentralized and disaster environment Preservation of heritage |

City Disaster Management Plan

Steps for preparation of City Disaster Management Plan



- Develop a disaster management plan: A disaster plan that documents the key roles and responsibilities of all stakeholders, risk analysis, vulnerability, emergency support systems etc. to serve as a ready reference for the line departments to take appropriate actions.
- Validate the plan: The plan must be tested and validated for its effectiveness. Conduct mock drills, table-top exercises with involvement of key departments to ensure efficacy of the plan.
- Review the plan: The plan must be reviewed at the state level by various departments to suggest any improvements and ensure inter-departmental coordination.
- Test the plan: Test the plan through role of functional and full scale emergency management exercises.
- Regular updation of the plan: The plan must be updated from time to time to reflect any changes in the organization, key officials, roles and regulations, structural inventory etc.
- Removal of action process: Removal of action process helps in identifying and highlighting the portions in the disaster management plan in that corrective actions can be taken.
- Plan distribution and approval: The plan must be distributed to the key government officials such as Commissioners, Mayors, Municipal Commissioners, key departments etc.

Integration of disaster mitigation planning into land use planning

- The preliminary activities include
- Preparatory work (data collection, research and analysis of available documentation)
 - Creation of a project team
 - Coordination with ULB's and field investigation
 - Formulation of the risk-sensitive land use plan
 - Advocacy campaigns
 - Drafting of zoning ordinance
 - Formulating and implementing building codes customized for a particular region based on the region's vulnerability
 - Inter-institutional coordination
 - Strengthening of local institutions.

The vulnerability of a region may be reduced by adopting 2 basic principles:

- Increasing the intrinsic disaster fighting potential
- Ensuring connectivity to other regions for availing external help at the earliest in cases of emergency.

Disaster Risk Reduction can not prevent hazards from taking place, but can definitely reduce the impacts of hazards...



Reshma T Vilasan
Urban Planner, RKI Project
KSDMA
Phone - 9605705798
reshmavilasan@gmail.com
rkskdma@gmail.com

Building Safety & LSG DM Plans

INDU V, ARCHITECT, RKI PROJECT, KSDMA | 08.02.2021

CONTENTS

- Multi-Hazard Resilient Construction
- Building Safety in DM Plans
- Retrofitting

WHAT?

1 Multi- Hazard Resilient Construction
A recap

A multi-hazard resilient building is one which:

- Suffers only minor damage after any type of disaster.
- Can easily be repaired
- Usable immediately after the disaster with least cost and time.

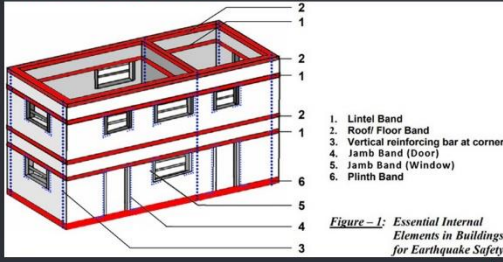
Performance objectives under different intensities of earthquake shaking:
Minor shaking → low repairable damage
Moderate shaking → low repairable damage
Strong shaking → collapse prevention

Image Source: Earthquake, Title: RT Kanauj & BKITTC



Hazard resilient.
Not hazard proof.
 Save lives; minimize damage.

STRUCTURAL FEATURES



WHAT ABOUT THE EXISTING BUILDING STOCK?

WHAT?

Reinforcement or upgrading of existing structures to become more resistant and resilient to the damaging effects of hazards.

Retrofitting ≠ Repair

WHY?

- Safer: Minimizes damage to life and property
- Improves resilience
- Greener: Increases the lifespan of existing building stock



Image Source: Disaster Risk Reduction: A Handbook for Urban Managers, BHTPC & UNDP

STEPS IN RETROFITTING



13

HOW?

Where to build?

- Site selection: Location, Hazard Susceptibility

What to build with?

- Appropriate building materials: good quality, *pucca*

How to build?

- Design: Architectural, structural
- Principles: ABCDE
- Appropriate construction techniques
- Techno-legal regimes

6

NON-STRUCTURAL FEATURES



Image Source: Building an Earthquake Resilient Infrastructure, UNDP, 2014

8

2 Retrofitting for DRR

Strengthening the existing building stock



HOUSES



CRITICAL LIFE LINE BUILDINGS

- Serve critical functions in responding to a disaster event.
- Hospitals, Police Stations, Fire Stations, Administrative Centres: Crucial role in emergency response
- Schools, Community halls: Evacuation centres and relief camps
- Retrofitting not only saves lives of vulnerable people but also ensure prompt and efficient response to disasters.



Photo Courtesy: Dr. Jayendra Dixit

12

RAPID VISUAL SCREENING (RVS)

A basic methodology to assess a large stock of buildings in a town or city only by observing the building and walking around it, and recording features that determine how the building will likely behave during a particular hazard impacts.

- Not a detailed analysis
- To be done only by trained personnel (civil engineering or architecture background)



Image Source: Disaster Risk Reduction: A Handbook for Urban Managers, BHTPC & UNDP

14



CHAPTERS MENTIONING BUILDINGS

- അദ്ധ്യായം 1. തദ്ദേശ സ്വയം ഭരണ സ്ഥാപനം - പൊതുവിവരങ്ങൾ
- അദ്ധ്യായം 2. ദുരന്തങ്ങളും ദുരന്ത സാധ്യതകളും വിശദീകരണം
- അദ്ധ്യായം 3. ദുരന്ത പ്രതികരണ പദ്ധതി
- അദ്ധ്യായം 4. മുന്നൊരുക്കം, ലഘൂകരണം, സാമൂഹ്യശക്തികരണം
- അദ്ധ്യായം 5. ശേഷിപ്പിച്ചും വിവേദനയും
- അദ്ധ്യായം 6. കലാപസ്ഥാനസൂത്ര ദുരന്ത ലഘൂകരണ പ്രൊജക്റ്റ് നിർദ്ദേശങ്ങൾ

Who is vulnerable?

- പുറംനാടകിയിൽ വസിക്കുന്നവർ
 - കോളനികൾ പഴയതല്ലെങ്കിൽ നിർമ്മാണവകുപ്പിന്റെ അനുമതിയില്ലാതെ മാറ്റം വരുത്തുന്നവർ
 - വയൽ കരകളിൽ താമസിക്കുന്നവർ
 - മലയുടെ ചരിവുകളിലും മുറ്റപ്പട്ട പ്രദേശത്തും വസിക്കുന്നവർ
 - ഓരോ മുറ്റപ്പട്ടയിൽ/ മണ്ണടിയിൽ/ വെള്ളപ്പൊക്കം എന്നിവ
 - ബാധിക്കുകയും വാസയോഗ്യമാക്കി മാറ്റുന്നതിനായി സർക്കാർ ഓഫീസ് ജില്ലാ ദുരന്ത നിവാരണ അതോറിറ്റി എന്നിവർ കണ്ടെത്തുകയും ചെയ്ത സ്ഥലങ്ങളിൽ താമസിക്കുന്ന ദുരന്ത ബാധിതർ
 - 20ാമത്ത് മുൻപുള്ളതല്ല/ മണ്ണടിയിൽ/ വെള്ളപ്പൊക്കം എന്നിവ ബാധിക്കുകയും വാസയോഗ്യമാക്കി മാറ്റുന്നതിനായി സർക്കാർ ജില്ലാ ദുരന്ത നിവാരണ അതോറിറ്റികൾ നിശ്ചയിച്ച സൗകര്യം കണ്ടെത്തുകയും ചെയ്ത സ്ഥലങ്ങളിൽ താമസിക്കുന്ന ദുരന്ത ബാധിതർ
 - പുറംനാടകിയിൽ താമസിക്കുന്നവർക്ക് വീട് പൂർണ്ണമായും തകരുകയും വാസയോഗ്യമാക്കി മാറ്റുന്നതിനായി സർക്കാർ കൂട്ടായ്മയ്ക്കും
 - ദുരന്തബാധിത സഹായം ഉപയോഗിച്ചെടുത്ത വീട് നിന്ന് പുതിയ നിർമ്മാണം പൂർത്തിയാക്കിയിട്ടില്ലാത്ത കൂട്ടായ്മയ്ക്കും
- മുന്നറിയിപ്പിനെ വെച്ചിട്ടില്ലാത്ത തടസ്സമുള്ള ഓഫീസുകൾ പ്രവർത്തനത്തിൽ മേൽനോട്ടത്തിൽ ആദ്യ പരിഗണന നൽകണം. ഈ തിരയിൽ മുൻപണയാകും തദ്ദേശ സ്ഥാപനം നിർദ്ദേശിക്കുക.

MOST RELEVANT SECTIONS

- അദ്ധ്യായം 4. മുന്നൊരുക്കം, ലഘൂകരണം, സാമൂഹ്യശക്തികരണം
 - 4.1. മുന്നൊരുക്ക പ്രവർത്തനങ്ങൾ
 - വീടിന് കൂടുതൽ പ്രവർത്തിക്കേണ്ട ഹാജകളും സ്കൂൾ കെട്ടിടങ്ങളും പട്ടികപ്പെടുത്തുക.
 - അപരിചയപരമായ അറ്റകുറ്റപ്പണികൾ എന്തൊക്കെ ആണെന്ന് മുൻകൂട്ടി ഏറ്റെടുക്കുക.
 - അപരിചയപരമായ പൊതു ഓഫീസുകൾ, വിദ്യാഭ്യാസ സ്ഥാപനങ്ങൾ എന്നിവയുടെയും സുരക്ഷയ്ക്കു പരിശോധന → സുരക്ഷാ പരിശോധനയെ അടിസ്ഥാനമാക്കിയുള്ള മരണസാധിത ഉപകരണങ്ങൾ
 - വീടിന് കൂടുതൽ പ്രവർത്തിക്കേണ്ട കെട്ടിടങ്ങളുടെ വൈദ്യുതി സാധനങ്ങൾ, കൂടിവെള്ള ലഭ്യത ശുചിമുറി സൗകര്യങ്ങൾ എന്നിവ പരിശോധിച്ച പ്രവർത്തന ക്ഷമയാക്കുന്നതിനുള്ള പ്രൊജക്ടുകൾ തയ്യാറാക്കുന്നതിനാണ്.

(Contd.)

MOST RELEVANT SECTIONS

- അദ്ധ്യായം 4. മുന്നൊരുക്കം, ലഘൂകരണം, സാമൂഹ്യശക്തികരണം
 - 4.2. ദുരന്ത ലഘൂകരണ പ്രവർത്തനങ്ങൾ
 - മൂലനിവൃത്തി സൗകര്യം പ്രവർത്തനങ്ങൾ
 - മുൻനിരയോടു അനുയോജനം
 - ഹാജ നിർമ്മാണ പ്രവർത്തനങ്ങൾ

(Contd.)

3 Building Safety in DM Plans Role of LSGs

MOST RELEVANT SECTIONS

- അദ്ധ്യായം 1. തദ്ദേശ സ്വയം ഭരണ സ്ഥാപനം - പൊതുവിവരങ്ങൾ
 - 11. ഭൂപ്രകൃതി
 - 15. വിദ്യാഭ്യാസം
 - 15.1 വിദ്യാഭ്യാസ സ്ഥാപനങ്ങൾ. Table 18. വിദ്യാഭ്യാസ സ്ഥാപനങ്ങൾ. സർക്കാർ/ എസ്.എസ്.എസ്.
 - 16. ആരോഗ്യ സ്ഥാപനങ്ങൾ. Table 110. ആരോഗ്യ സംരക്ഷണ സ്ഥാപനങ്ങൾ
 - 17. കമ്മ്യൂണിറ്റി സെന്ററുകൾ. Table 112. കമ്മ്യൂണിറ്റി സെന്ററുകൾ/ പാലൂകൾ
 - 19. പൊതുജന സൗകര്യങ്ങൾ
 - 19.3. വാസ യോഗ്യമായ കെട്ടിടങ്ങൾ. Table 116. വാസ യോഗ്യമായ കെട്ടിടങ്ങൾ (എസ്.എസ്.എസ്.)
 - 19.4. അപരിചയപരമായ കെട്ടിടങ്ങൾ/ എസ്.എസ്.എസ്. Table 117. അപരിചയപരമായ കെട്ടിടങ്ങൾ (എസ്.എസ്.എസ്.)
 - 19.5. കോളനികൾ. Table 118. ലോ ഊർക്കം ഗ്രൂപ്പ്/ കോളനികൾ/ വാസസ്ഥലങ്ങൾ

MOST RELEVANT SECTIONS

- അദ്ധ്യായം 2. ദുരന്തങ്ങളും ദുരന്ത സാധ്യതകളും വിശദീകരണം
 - 2.4. ദുരന്ത സാധ്യത പ്രദേശങ്ങൾ. Table 25. ദുരന്ത സാധ്യത പ്രദേശങ്ങൾ
 - 2.6. ദുരന്ത ശേഷിപ്പിച്ച പ്രദേശങ്ങളിലെ പൊതു കെട്ടിടങ്ങൾ. Table 2.7. ദുരന്ത ശേഷിപ്പിച്ച പ്രദേശങ്ങളിലെ പൊതു കെട്ടിടങ്ങൾ
- അദ്ധ്യായം 3. ദുരന്ത പ്രതികരണ പദ്ധതി
 - Table 35. ഷെൽറ്റർ മാനേജ്‌മെന്റ്
 - Table 39. വെള്ളപ്പൊക്കത്തിന് അനുയോജ്യമായ ഷെൽറ്റർ പദ്ധതികൾ → എസ്.എസ്.എസ്. അടുത്ത മുൻനിരയോടു കൂടും

MOST RELEVANT SECTIONS

പട്ടിക 4.3 ഉറപ്പായതും പ്രവർത്തനങ്ങൾ (ഉദാഹരണം 3)

| നവീകരണത്തിന്റെ നിലവാരം | | | | | | |
|------------------------|------|----------------|----------------|----------------|----------------|----------------|
| കുറഞ്ഞതും താഴെ | മധ്യ | ഉയർന്നതും ഉപരി | ഉയർന്നതും ഉപരി | ഉയർന്നതും ഉപരി | ഉയർന്നതും ഉപരി | ഉയർന്നതും ഉപരി |
| | | | | | | |
| | | | | | | |
| | | | | | | |

How can this be improved?

Apart from the previously mentioned aspects the buildings which are to function as relief camps must also ensure the following:

- Universal access: Ramps, handrails, toilet for differently abled
- Fire fighting systems

Types of Mitigation Measures

| Structural Mitigation | Non-structural Mitigation |
|--|---|
| Any physical construction to reduce or avoid possible impacts of hazards, or the application of engineering techniques or technology to achieve hazard resistance and resilience in structures or systems. | Not involving physical construction but use knowledge, practice or agreement to reduce disaster risks and impacts, in particular through policies and laws, public awareness raising, training and education. |
| Eg: dams, flood levees, ocean wave barriers, earthquake-resistant construction and evacuation shelters. | Eg: building codes, land-use planning laws and their enforcement, research and assessment, information resources and public awareness programmes. |

How to improve Mitigation?

Structural Mitigation

- Construction of multi-purpose shelters (cyclone, floods etc.)
- Retrofitting of unsafe houses or relocation.
- Retrofitting of critical life line buildings
- Safe dismantling of unsafe structures

Non-structural Mitigation

- Ensuring hazard resilience of houses
- Safety audit of critical lifeline buildings
- Capacity building: Masons, site supervisors, engineers, architects, builds on hazard resilient construction and other aspects of building safety.
- Registration of trained masons, engineers, architects etc.
- Conducting mock-drills
- Ensure strict compliance: KMBR, KPBR, CRZ regulations etc.

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MOST RELEVANT SECTIONS

അദ്ധ്യായം 5. ശേഷികളും വിഭവങ്ങളും



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MOST RELEVANT SECTIONS

അദ്ധ്യായം 6. കാലാവസ്ഥാനുസൃത ദുരന്ത ലഘൂകരണ പ്രൊജക്ട് നിർദ്ദേശങ്ങൾ

Suggestions

- RVS, detailed assessment and retrofitting** of a selected few critical lifeline buildings as a pilot project
 - Stakeholders: LSG Engineering, Concerned government departments (Eg: Department of Education in case of retrofitting a school), Technical Institutions (Civil engineering, Architecture), Professional bodies (The Institution of Engineers, Indian Institute of Architects etc.)
 - Output: Resilient critical lifeline buildings
 - Outcome: Lives saved, damage reduced → More resilient LSGI.

(Contd.)

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IN A NUTSHELL

- Existing buildings: Retrofitting.
- New buildings: Multi-hazard resilient construction.
- Relocation to safer areas.
- Mainstream DRR in existing govt. schemes.
- Zone wise specifications
- Ensure compliance
- Damage assessment.
- Housing reconstruction policy framework.
- Transitional housing.
- Supervise and monitor safe reconstruction.



- Identify buildings for relief camps.
- Undertake immediate repairs in houses and other buildings.
- Household preparedness: Promote a culture of preparedness.
- Arrange for temporary shelter materials.
- Ready the shelters
- Prioritise vulnerable groups
- Manage the shelters with Revenue department
- Temporary latrines, tents
- Cleaning of houses, wells

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MOST RELEVANT SECTIONS

അദ്ധ്യായം 5. ശേഷികളും വിഭവങ്ങളും

ക്രമം 5.5 നാശനഷ്ടങ്ങളുടെ സുരക്ഷിത പരിഹാരമാർഗ്ഗങ്ങൾ

| ക്രമ നമ്പർ | സാമ്പത്തിക ആവശ്യകതകൾ | പുനർനിർമ്മാണ ചെലവുകൾ | പുനർനിർമ്മാണ സമയം | പുനർനിർമ്മാണ സുരക്ഷിത പരിഹാരമാർഗ്ഗങ്ങൾ | | | |
|------------|----------------------|----------------------|-------------------|--|--|--|--|
| | | | | പുനർനിർമ്മാണ സുരക്ഷിത പരിഹാരമാർഗ്ഗങ്ങൾ | പുനർനിർമ്മാണ സുരക്ഷിത പരിഹാരമാർഗ്ഗങ്ങൾ | പുനർനിർമ്മാണ സുരക്ഷിത പരിഹാരമാർഗ്ഗങ്ങൾ | പുനർനിർമ്മാണ സുരക്ഷിത പരിഹാരമാർഗ്ഗങ്ങൾ |
| 1 | | | | | | | |
| 2 | | | | | | | |
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| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |

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MOST RELEVANT SECTIONS

അദ്ധ്യായം 6. കാലാവസ്ഥാനുസൃത ദുരന്ത ലഘൂകരണ പ്രൊജക്ട് നിർദ്ദേശങ്ങൾ

Suggestions

- Mapping of vulnerable households and settlements** (refer table 1.16, 1.18 and slide 19)
 - Stakeholders: DDMA, Technical institutions (Engg. colleges, Polytechnic colleges, etc.), Voluntary organizations, *sarnadhasena* members with technical expertise etc.
 - Output: Ward level maps (Spatial representation of existing data).
 - Outcome: Evacuation plans → streamlined response

(Contd.)

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MOST RELEVANT SECTIONS

അദ്ധ്യായം 6. കാലാവസ്ഥാനുസൃത ദുരന്ത ലഘൂകരണ പ്രൊജക്ട് നിർദ്ദേശങ്ങൾ

Suggestions

- Capacity building programmes** on multi-hazard resilient construction, sustainable building practices, retrofitting and transitional housing for masons, site supervisors, engineers, architects, shelter management team etc.
 - Stakeholders: LSG Engineering, PWD Buildings Wing, Technical Institutions (Civil engineering, Architecture), Professional bodies (The Institution of Engineers, Indian Institute of Architects etc.), CREDAI, National level technical experts
 - Output: A registry of trained professionals
 - Outcome: Multi-hazard resilient houses and public buildings → More resilient LSGI.

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REFERENCES

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- Disaster Risk Reduction A Handbook for Urban Managers- BMTPC & UNDP <https://nri.mindia.rmu.gov.in/images/pdf/DRRHandbookUrbanManagers.pdf>
- Orange Book of Disaster Management 2: Monsoon Preparedness and Response Guidelines- KSDMA <https://sdma.kerala.gov.in/wp-content/uploads/2019/12/Orange-Book-of-Disaster-Management-2-2020.pdf>

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DAY 5 – PPT

1

SECTORAL INPUT SESSION FOR LSG DM PLAN COORDINATORS- SAFETY ENGINEERING

By,
Alen Abraham

Safety Engineering Tuesday, February 23, 2022

2

OVERVIEW

Safety Engineering Tuesday, February 23, 2022

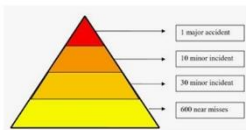
- Introduction
- Industrial Fire incidents
- Petrochemical transportation accidents
- Public gatherings and fire works
- Crash blackspots
- Other areas
- Conclusion

3

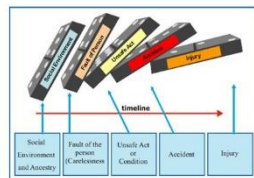
INTRODUCTION (1/3)

Safety Engineering Tuesday, February 23, 2022

INTRODUCTION (1/3)



Bird's Pyramid



Domino Theory

4

INTRODUCTION (2/3)

Safety Engineering Tuesday, February 23, 2022

INTRODUCTION (2/3)

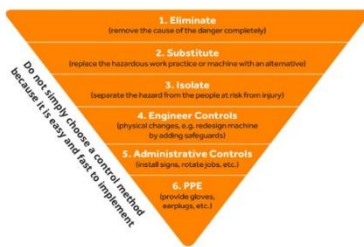
- **Birds pyramid**- relationship between serious accidents, minor accidents and near misses and proposes that if the number of minor accidents is reduced then there will be a corresponding fall in the number of serious accidents.
- **Domino theory**- all accidents, whether in a residence or a workplace environment, are the result of a chain of events.
 - The chain of events consists of the following sequential factors: ancestry and social environment, an individual's mistake, an unsafe action and/or physical hazard, the actual accident, and an injury as the result of the preceding factors.
 - These factors are described as dominoes, and the removal of any one of these five factors can prevent the accident.

5

INTRODUCTION- CONTROL MEASURES (3/3)

Safety Engineering Tuesday, February 23, 2022

INTRODUCTION- CONTROL MEASURES (3/3)

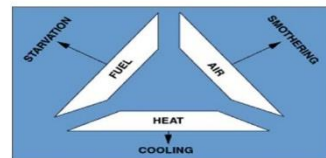


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FIRE (1/3)

Safety Engineering Tuesday, February 23, 2022

FIRE (1/3)



| Classes of fire | Description |
|------------------|------------------|
| Class A | Solid |
| Class B | Liquid |
| Class C | Gas |
| Class D | Flammable metals |
| Electrical fires | |

INDUSTRIAL FIRES (2/3)

- **Pool fire**- A Pool Fire is a fire on a stationary liquid surface, such as that of a pool of liquid hydrocarbon.
- **Jet fire**- A Jet Fire occurs when a hydrocarbon release from a pressurized source is ignited close to the source of the release.
- **Flash fire**- A Flash Fire, in effect, is a sheet of flame that moves through a cloud of gaseous or vaporized hydrocarbons, without any accompanying shock-wave. It rarely lasts for more than a few seconds, and causes little damage to equipment and installations, but is fatal to individuals in its path.



INDUSTRIAL FIRES (3/3)

Explosions

- **BLEVE**- Boiling Liquid Expanding Vapour Explosion – A BLEVE occurs when a liquefied, or occasionally a liquid, hydrocarbon is contained in a vessel exposed to an external fire.
- **UVCE**- Unconfined Vapour Cloud Explosion – A UVCE is similar to a flash fire, except that in addition to the flame front, a pressure front, generated by the fire, moves through the cloud, at speeds of 100 m /s or greater.



PETROCHEMICAL TRANSPORTATION ACCIDENTS

- Most common- LPG tanker accidents.
- Major tragedies- Chala and Karunagapally
- Blind spots in heavy vehicles



HAZARDOUS SUBSTANCES TRANSPORTED THROUGH THE CITY IN BULLET TANKERS

| HAZARDOUS SUBSTANCE | HAZARDOUS EFFECTS | HAZARDOUS EFFECTS | HAZARDOUS EFFECTS |
|-----------------------------|----------------------------|-----------------------------|----------------------------|
| 1. FLAMMABLE LIQUIDS | 2. FLAMMABLE SOLIDS | 3. OXIDIZING LIQUIDS | 4. OXIDIZING SOLIDS |
| 5. TOXIC LIQUIDS | 6. TOXIC SOLIDS | 7. CORROSIVE LIQUIDS | 8. CORROSIVE SOLIDS |
| 9. INFAMOUS LIQUIDS | 10. INFAMOUS SOLIDS | 11. HAZARDOUS GASES | 12. HAZARDOUS GASES |



PUBLIC GATHERINGS AND FIRE WORKS

- Puttingal tragedy- 10th April 2016
- 111 people killed, more than 350 got injured.
- Minimum of 150 houses got damaged nearby.



OTHER AREAS TO FOCUS

- **Hazardous Materials (HAZMAT)** can include explosives, flammable and combustible substances, poisons and radioactive materials.
- Emergencies can happen during production, storage, transportation, use or disposal.
- Dangerous rides in amusement parks.
- CBRN disaster response.
- Animal attacks.



CRASH BLACKSPOTS

- Crash Blackspots : 500m stretches where either 7 or more fatal or grievous accidents occur or 5 fatalities for 3 years
- As per MoRTH criteria.
- Action Plan: Junction improvement, Driver behavior improvement, road widening and lane traffic, signal synchronization.
- Decreasing Pedestrian accidents by providing foot over bridges, under passages, zebra crossings etc
- Road maintenance and improvement works should be carried out safely with pre warnings as per MoRTH specs and Indian road congress(IRC) recommendations.



CONCLUSION

- Database of previous events.
- Plans should be more location specific.
- Learning from events.
- Prioritize the risk.
- Identify the worst case scenario.

THANK YOU...!!!