Outline of the talk

- Overview of the Multi-hazard domain

- Ten key Principles of "Multi-hazard Early Warning System (MHEWS)"

- Essential preconditions to materialize these principles for MHEWS

1.
The multi-hazard domain

Storm

Forest Fire

Earthquake

Dam Failure

We all live with multi-hazards

Land Slide

Flood

Contamination

Tsunami

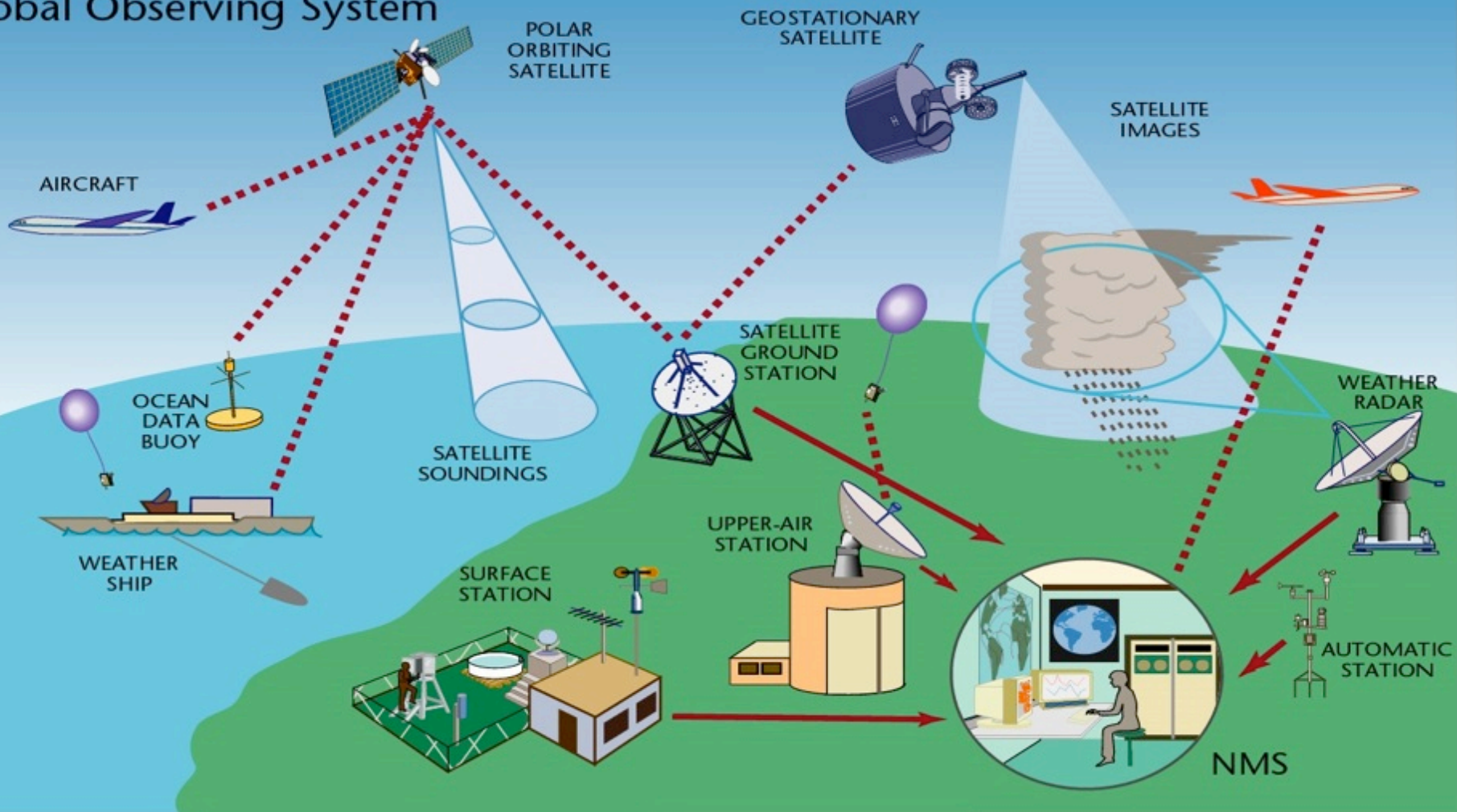# Multiple timescales for multiple hazards

Real-time 'now-casting'
Seconds-minutes

Earthquakes
Industrial threat
Dust devils
Tornados
Flash floods

Short-term forecasting
Hours-days

Severe storms
Wildfire
Tropical cyclones
Landslides
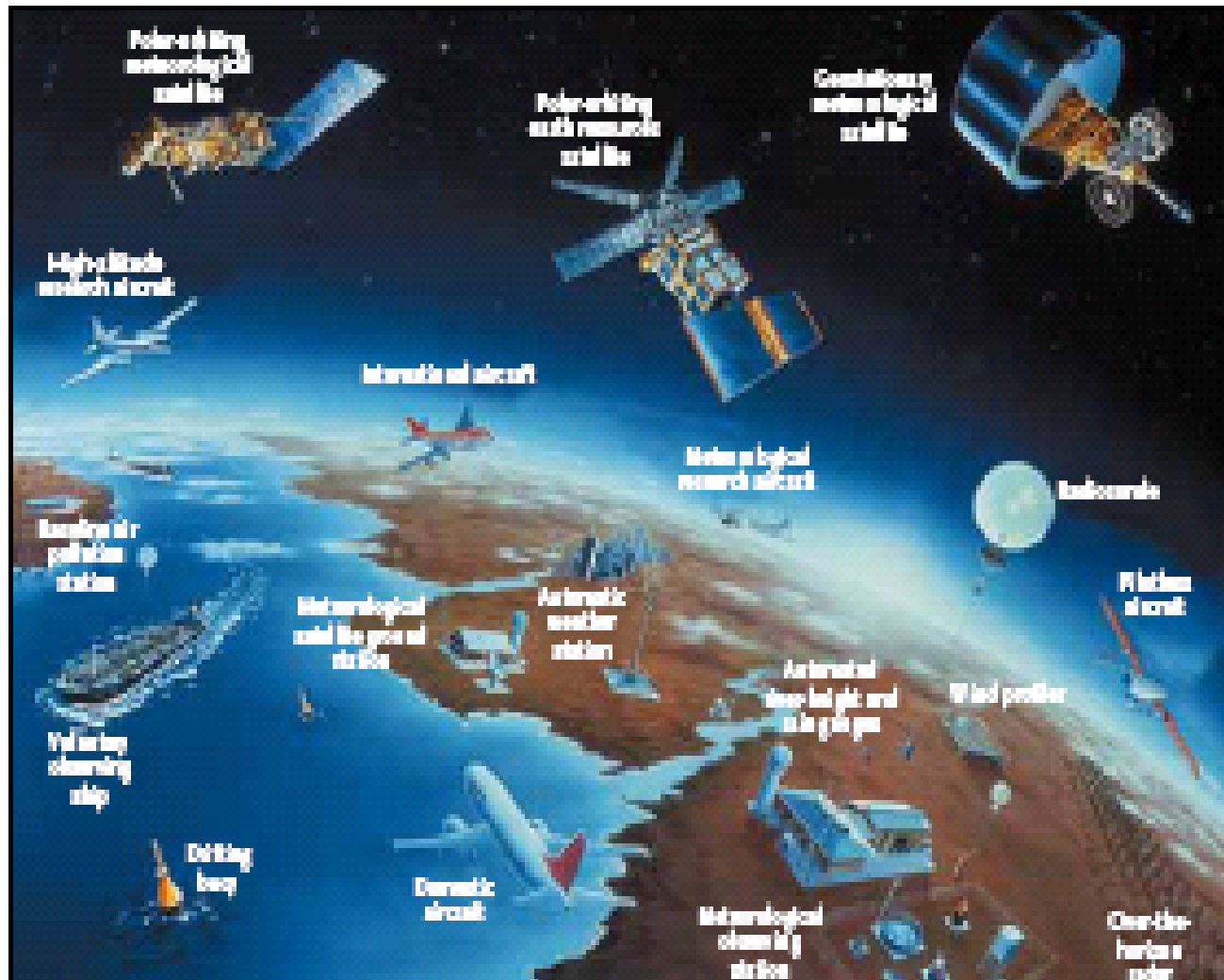Floods
Tsunamis
Volcanoes
Heatwaves
Epidemics

Medium-term forecasting
Weeks-months-seasons

Drought
ENSO
Extreme temperatures
Conflict

Long-term forecasting
Years or more

Sea level rise
Deforestation
Desertification
Dry spells
Extreme rainfall
Soil degradation
Environmental pollution

Global Observing System

AIRCRAFT

POLAR ORBITING SATELLITE

GEOSTATIONARY SATELLITE

SATELLITE IMAGES

OCEAN DATA BUOY

SATELLITE SOUNDINGS

SATELLITE GROUND STATION

WEATHER RADAR

WEATHER SHIP

SURFACE STATION

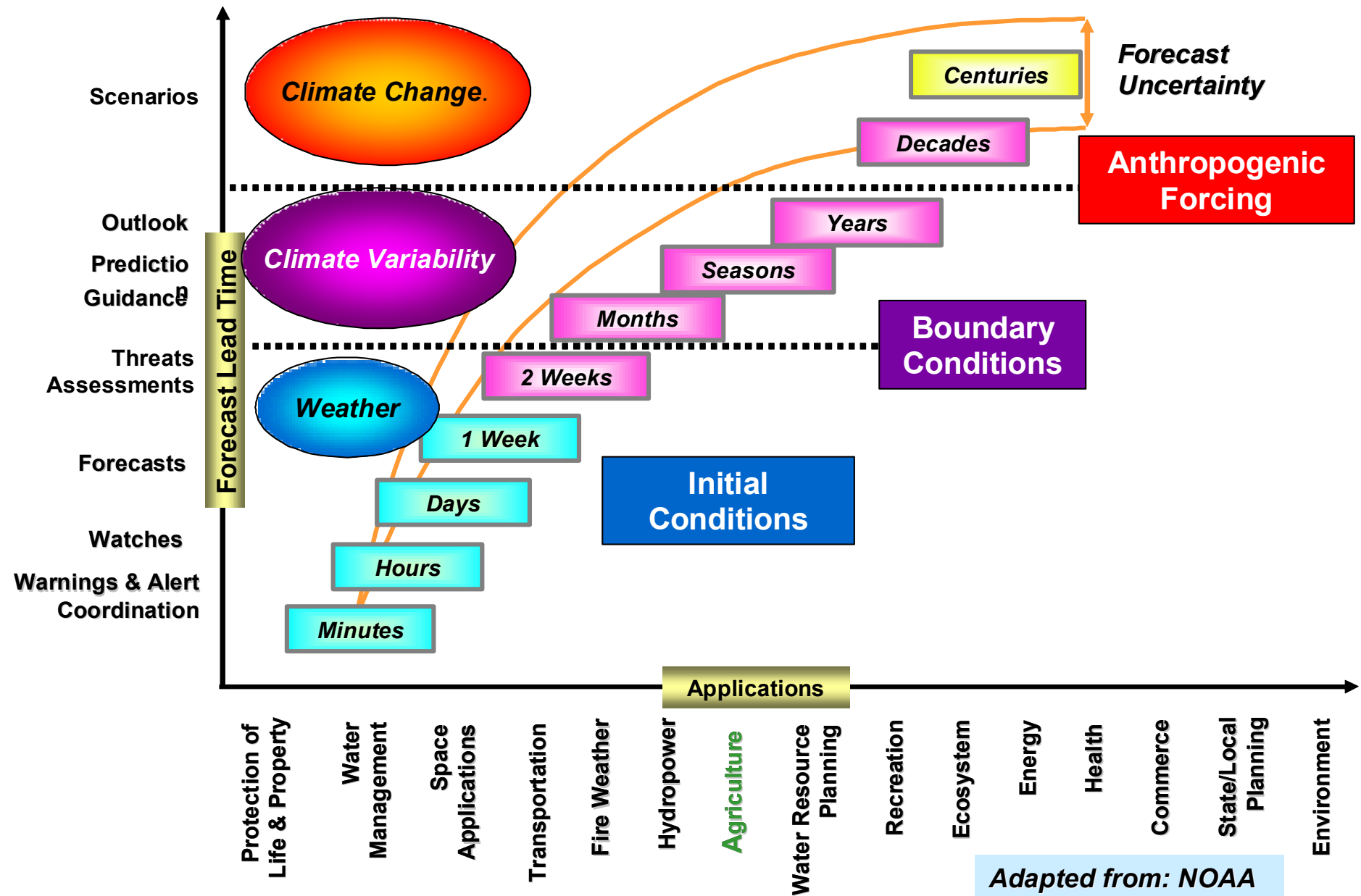UPPER-AIR STATION

AUTOMATIC STATION

NMS

WMO Global Framework on Climate Services

Science-based weather and climate information and prediction into planning, policy and practice on the global, regional and national scales

Climate Prediction Framework

Forecast Lead Time

Scenarios — *Climate Change.*

Outlook
Predictio n
Guidance — *Climate Variability*

Threats
Assessments — *Weather*

Forecasts

Watches

Warnings & Alert
Coordination

Minutes — *Hours* — *Days* — *1 Week* — *2 Weeks* — *Months* — *Seasons* — *Years* — *Decades* — *Centuries*

Forecast Uncertainty

Anthropogenic Forcing

Boundary Conditions

Initial Conditions

Applications

Protection of Life & Property — Water Management — Space Applications — Transportation — Fire Weather — Hydropower — Agriculture — Water Resource Planning — Recreation — Ecosystem — Energy — Health — Commerce — State/Local Planning — Environment

Adapted from: NOAA

Users, Government, private sector, research, agriculture, water, health, construction, disaster reduction, environment, tourism, transport, etc
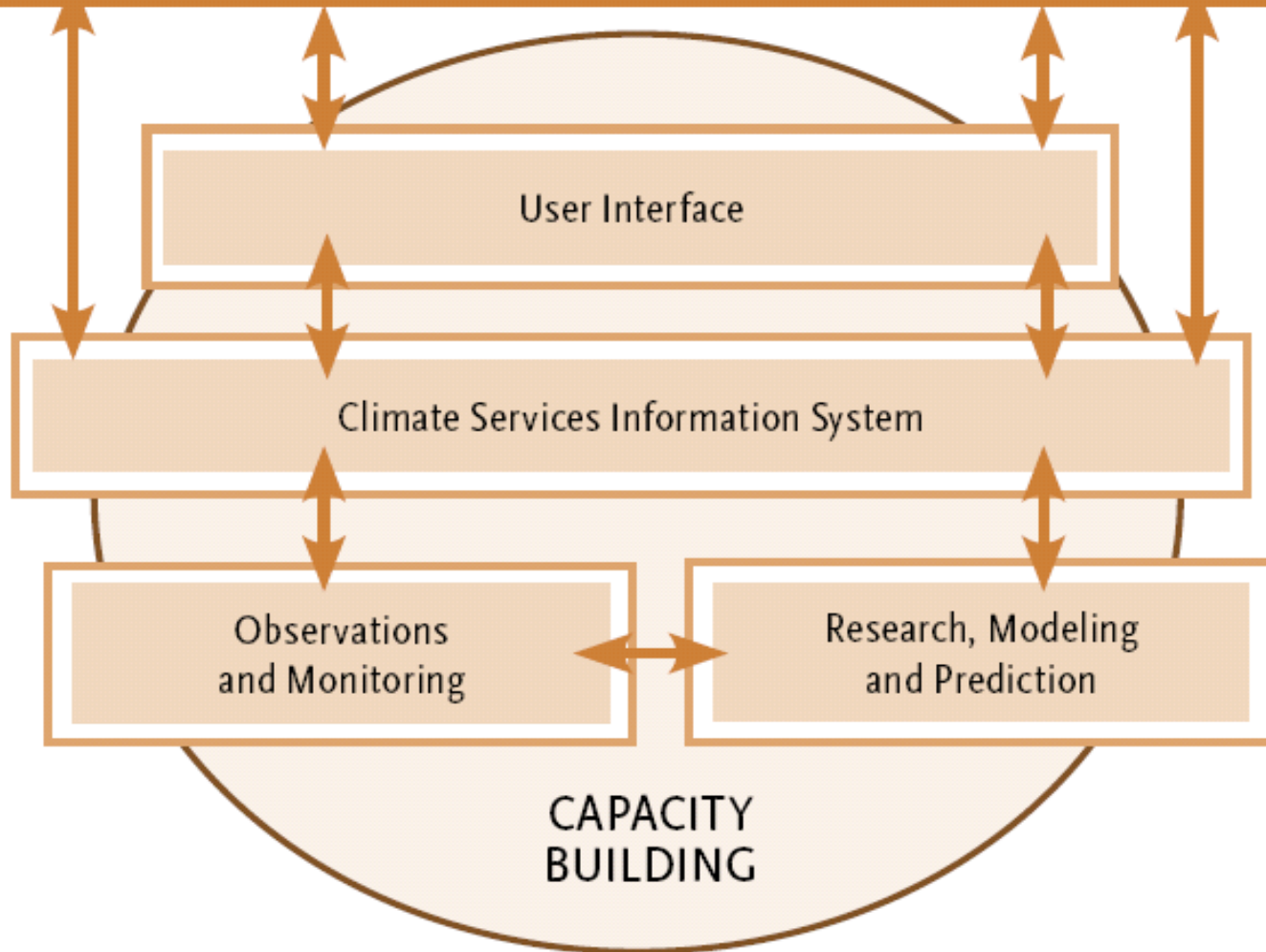
User Interface

Climate Services Information System

Observations and Monitoring

Research, Modeling and Prediction

CAPACITY BUILDING

2.
Principles and key aspects of Multi-hazard Early Warning System

Principles for MHEWS:

One: There is a **strong political recognition** of the benefits of EWS reflected in harmonized national to local disaster risk management policies, planning, legislation and budgeting.

Two: Effective EWS are built upon **four components**: (i) hazard detection, monitoring and forecasting; (ii) analyzing risks and incorporation of risk information in emergency planning and warnings; (iii) disseminating timely and "authoritative" warnings; and (iv) community planning and preparedness.

RISK KNOWLEDGE

Systematically collect data and undertake risk assessments

Are the hazards and the vulnerabilities well known?

What are the patterns and trends in these factors?

Are risk maps and data widely available?

MONITORING & WARNING SERVICE

Develop hazard monitoring and early warning services

Are the right parameters being monitored?

Is there a sound scientific basis for making forecasts?

Can accurate and timely warnings be generated?

DISSEMINATION & COMMUNICATION

Communicate risk information and early warnings

Do warnings reach all of those at risk?

Are the risks and warnings understood?

Is the warning information clear and useable?

RESPONSE CAPABILITY

Build national and community response capabilities

Are response plans up to date and tested?

Are local capacities and knowledge made use of?

Are people prepared and ready to react to warnings?

Three: EWS stakeholders are identified and their **roles and responsibilities and coordination mechanisms** clearly defined and documented within national to local plans, legislation, directives, Memorandums of Understanding (MoUs), etc.
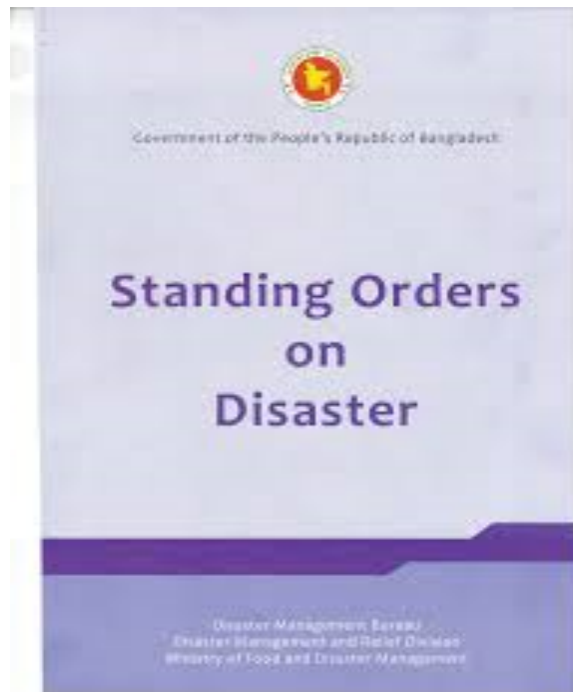
Four: EWS capacities are supported by **<u>adequate resources</u>** (e.g., human, financial, equipment, etc.) across national to local levels and the system is designed and for long-term sustainability.

Five: Hazard, exposure and vulnerability information are used to carry-out **<u>risk assessments</u>** at different levels, as critical input into emergency planning and development of warning messages.

Risk = Hazard x Exposure x Vulnerability

Spatial risk assessments

Physical and social risks

Enhancement of risk knowledge

Risk modeling

Long term changing patterns of risks
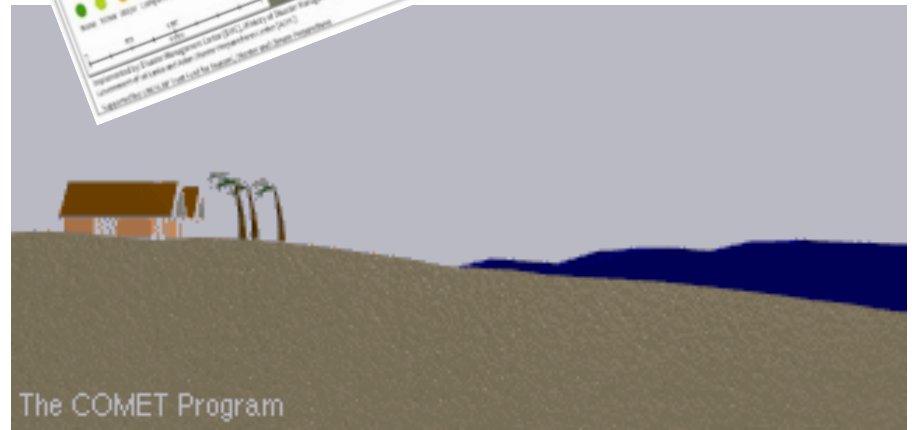
The COMET Program

Six: Warning **messages** are: (i) clear, consistent and include risk information; (ii) designed with consideration for linking threat levels to emergency preparedness and response actions (e.g., using colour, flags, etc) and understood by authorities and the population; and (iii) issued from a single (or unified), recognized and "authoritative" source.


HOISTING OF SIGNAL FLAGS

SIGNAL NO 1 - 3
SIGNAL NO 4 - 7
SIGNAL NO 8 - 11

পতাকার রং দেখে পানি বাড়া বা কমার সম্ভাবনা বুঝুন

একটি লাল পতাকা অর্থ আগামী ২৪ বা ৪৮ ঘন্টায় আধাহাত এবং দুইটি লাল পতাকা অর্থ একহাত পরিমান পানি বাড়ার সম্ভাবনা আছে

একটি হলুদ পতাকা অর্থ আগামী ২৪ বা ৪৮ ঘন্টায় আধাহাত এবং দুইটি হলুদ পতাকা অর্থ একহাত পরিমান পানি কমার সম্ভাবনা আছে

জলেরাখবন লাল পতাকা অর্থ পানি বাড়বে এবং হলুদ পতাকা অর্থ পানি কমবে।

DFID   adpc
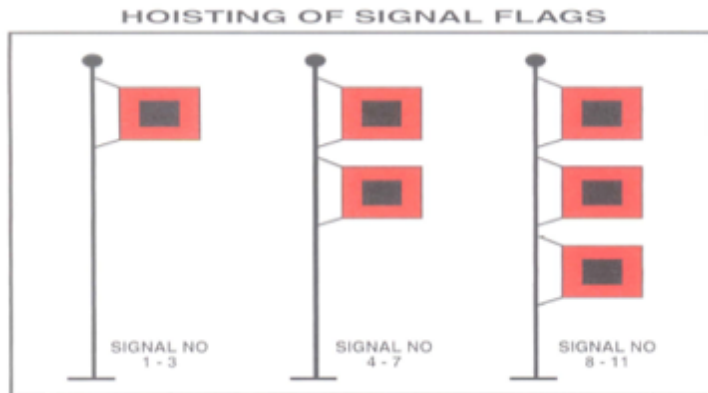
Seven: Warning **dissemination mechanisms are able to reach** the authorities, other EWS stake-holders and the population at risk in a timely and reliable fashion.

Redundant modes of dissemination….

Build on local modes of communication and dissemination
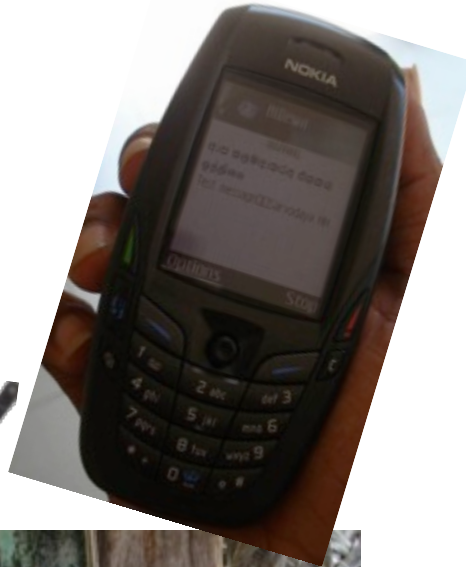
Eight: Emergency **response plans** are developed with consideration for hazard/ risk levels, characteristics of the exposed communities.
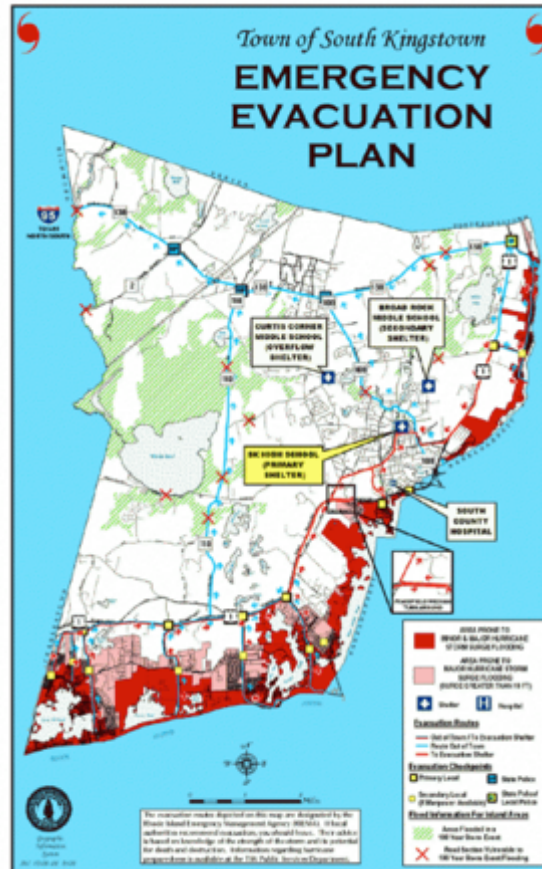
Procedures for 'evacuation'

Procedures for 'disaster relief and response coordination'

(SOP help for systematic coordination and to deal with limited supply vs. large need)

The Sphere Project

Humanitarian Charter and Minimum Standards in Humanitarian Response

2011 EDITION

Humanitarian Charter	Protection Principles				
Core Standards					
Standard 1 People-centred humanitarian response	**Standard 2** Coordination and collaboration	**Standard 3** Assessment	**Standard 4** Design and response	**Standard 5** Performance, transparency and learning	**Standard 6** Aid worker performance
References and further reading					

## Procedures for 'vulnerable group' inclusiveness

(e.g. disable, child, elderly, people of special needs)

Procedures ranging from universal design, accessibility to information and structures to other needed measures …….
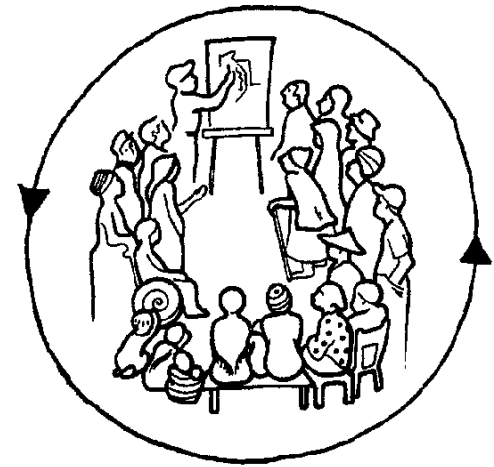
Nine: Training on hazard/risk/emergency preparedness **awareness** integrated in various formal and informal educational programmes with regular drills to ensure operational readiness.
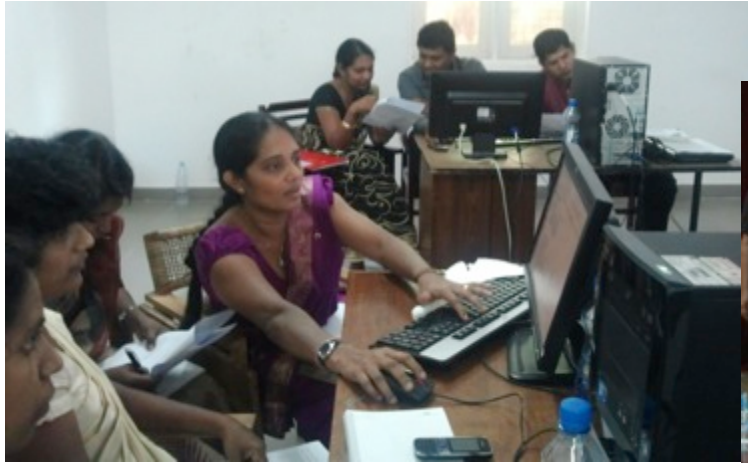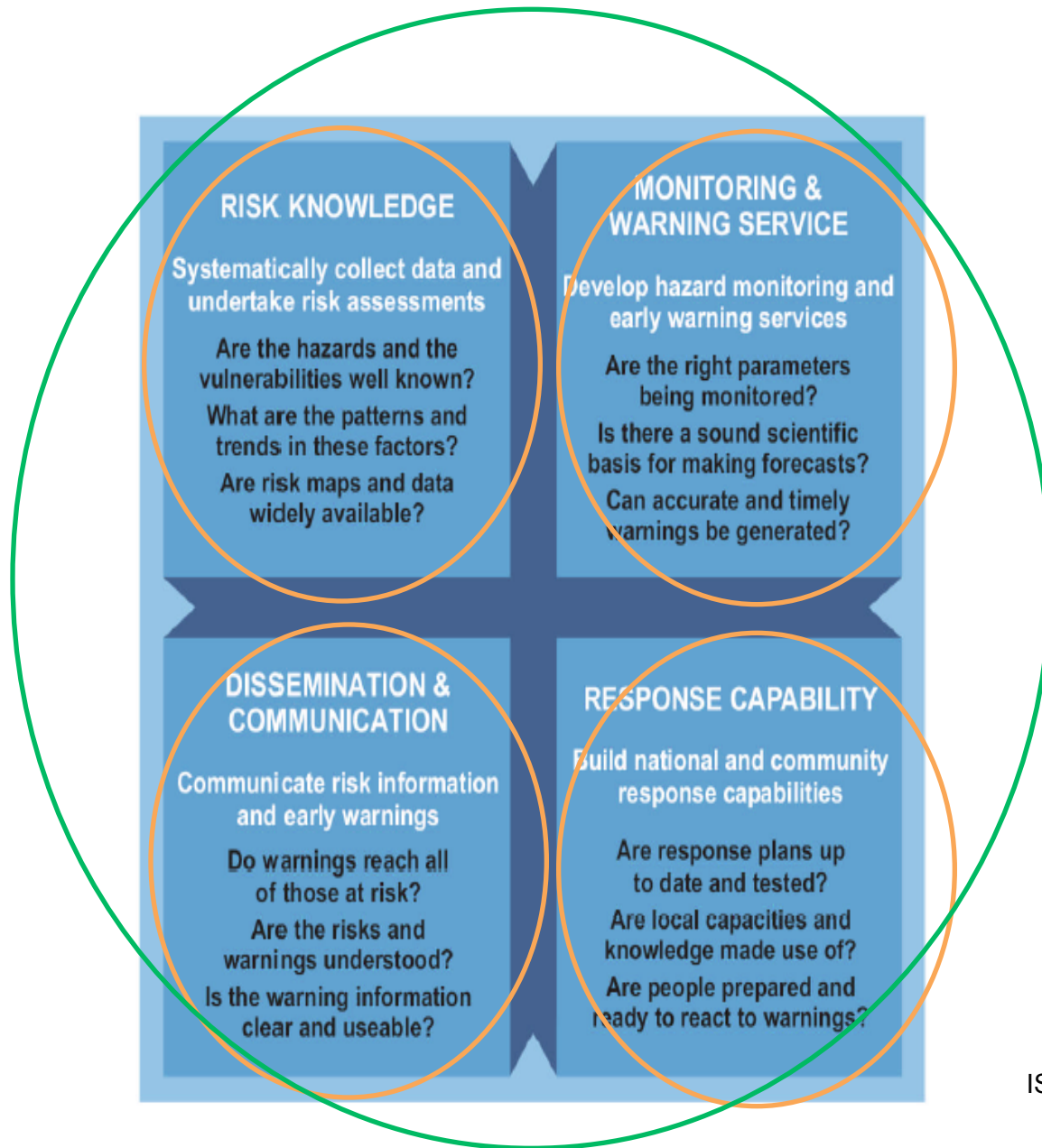
Ten: Effective **feedback and improvement mechanisms are in place** at all levels of EWS to provide systematic evaluation and ensure system improvement over time.
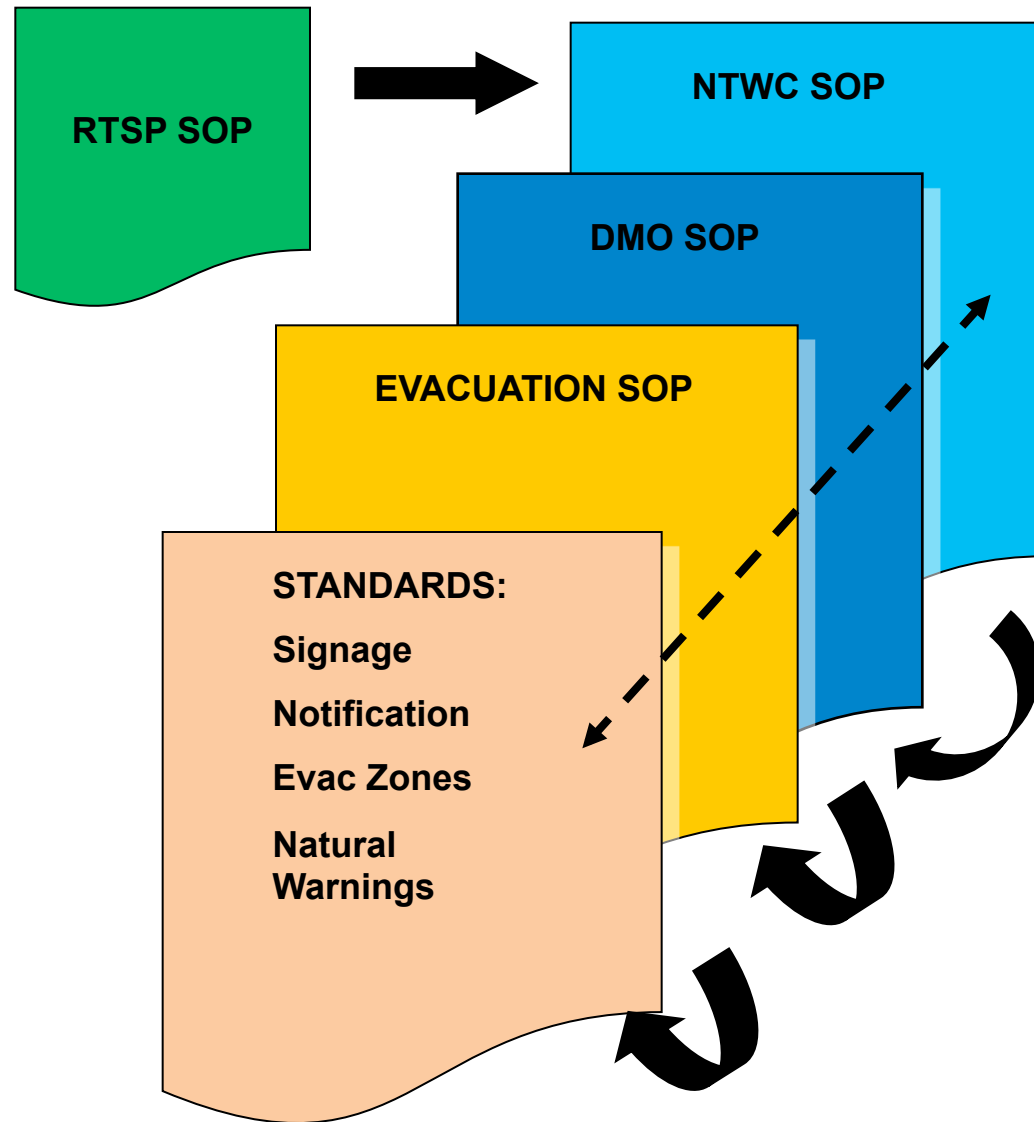
3.
# Essential preconditions to materialize the principles

Synergized SOPs!

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RESPONSE CAPABILITY

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Are response plans up to date and tested?

Are local capacities and knowledge made use of?

Are people prepared and ready to react to warnings?

ISDR, 2006

Coherent SOPs…

RTSP SOP

NTWC SOP

DMO SOP

EVACUATION SOP

STANDARDS:

Signage

Notification

Evac Zones

Natural Warnings

After IOC, 2013

Getting the science right!

Setting the observation network

Setting the correct threshold

Achieve accuracy of models and outputs
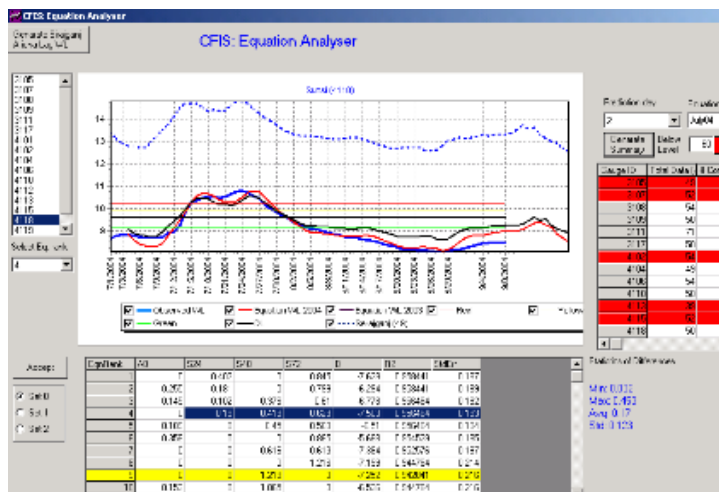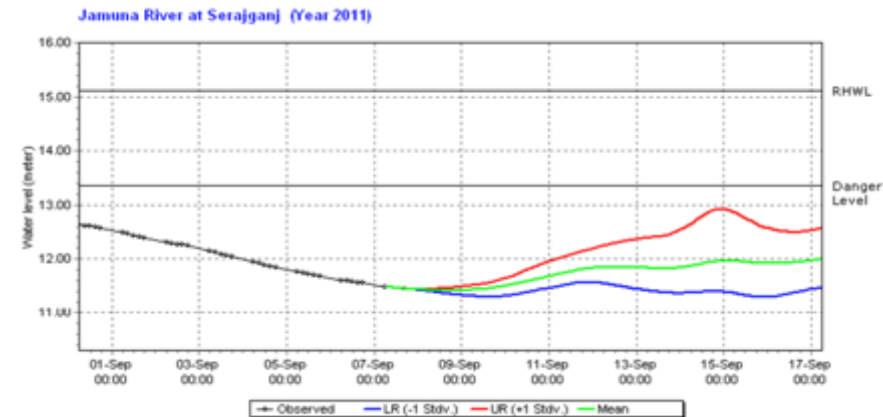
Mechanism: Multi-Hazard Early Warning Dissemination System

Example: Sri Lanka

PTWC

Receiving Early Warnings

USGS	GDACS	INCOIS	INDONESIAN MET	AUS-MET	NARA	DOM	GSMB
					DOI	MEPA	CCD

Government Agencies, Critical Agencies & Stakeholders

Police

Media & General Public

Military

Regional & International Organizations

UN System, INGOs, NGOs

Dissemination of Warning

Multi-Hazards Early Warning Dissemination Unit of the DMC

Out Puts

- Radio Comm
- SLT/ Dialog, SMS
- Fax
- Internet
- Satellite com

- Cell Broad.
- Police Com

- Military Com
- Warning Towers
- DEWN

- Media

Provincial Councils

District Secretariats

Divisional Secretariats

Local Authorities

Police Stations

Hospitals

Government Dpt.

NGOs, CBOs

24 Emergency Operation Center

District Disaster Management Committees
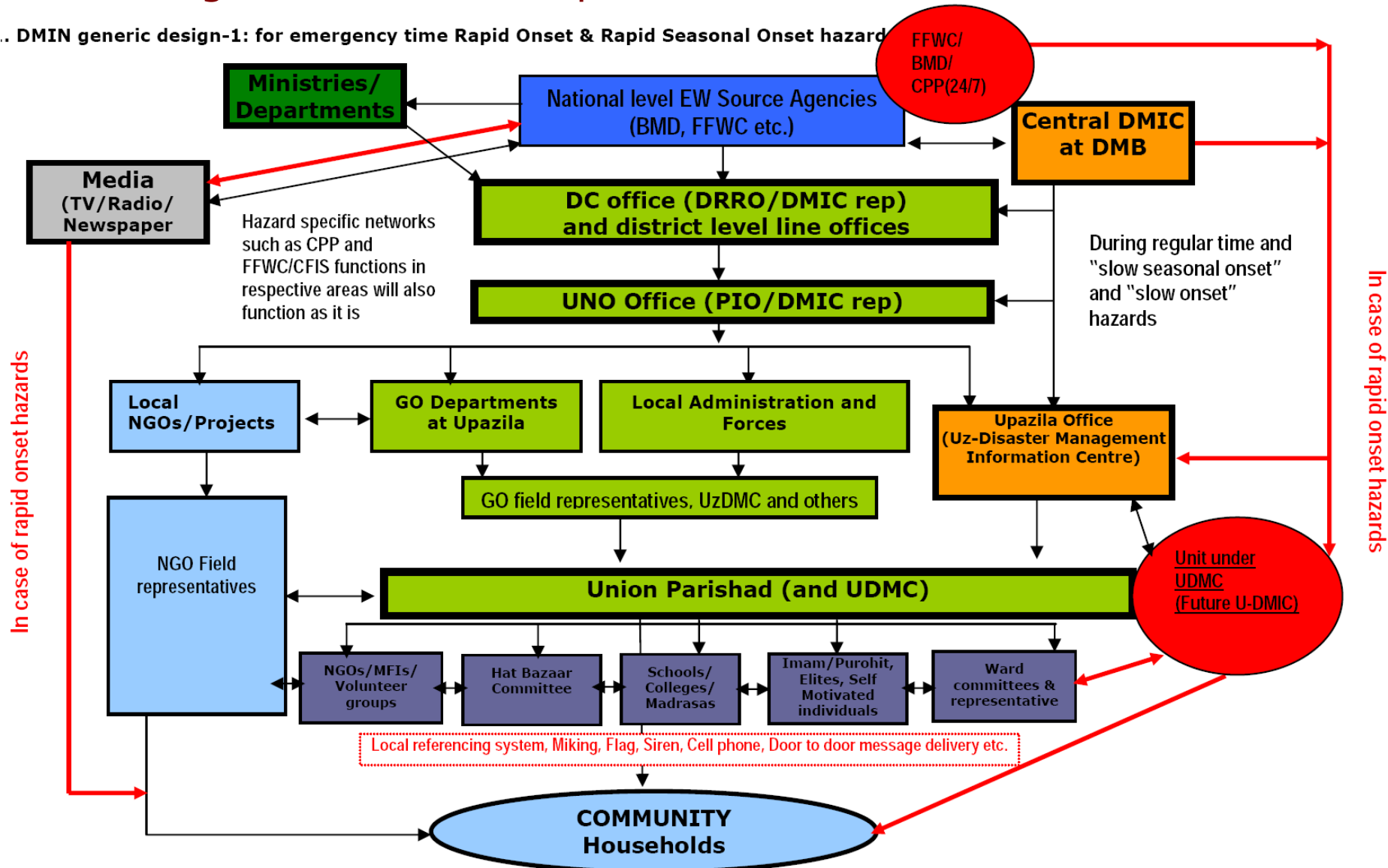
Divisional Disaster Management Committees

Village level DM Committees

Speaker Sys.	Bells / Sirens	Messengers	Riders / Cyclers

Mechanism: "end-to-end" enabling institutional setup

Example: Bangladesh - National

.. DMIN generic design-1: for emergency time Rapid Onset & Rapid Seasonal Onset hazard

Note: Red line represents rapid onset risk communication and **black line** represents regular, slow seasonal onset and slow onset risk communication which has enough lead-time for formal institutional machinery to start operate. During the rapid onset (both episodic and seasonal) the systems starts a voluntary rapid step (red line) and follows up with the regular formal institutional procedures for resources mobilization and so forth.

Linking EW/forecasts with local levels

Jamuna River at Serajganj (Year 2009)

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RIVER SITUATION AS ON 24-08-2009 AT 06:00 HOURS
---------------------------------------------
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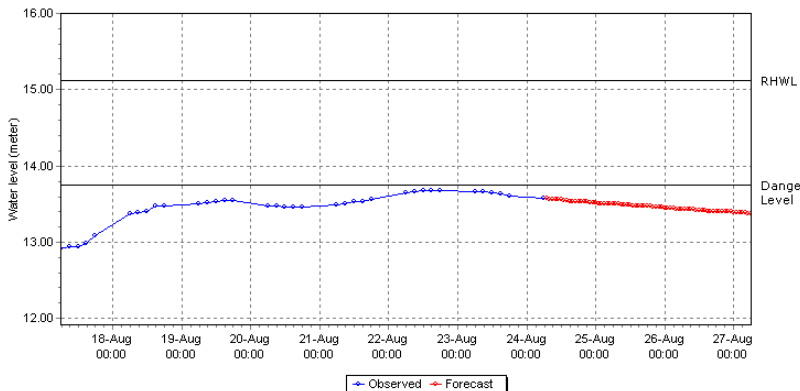
SL	RIVER	STATION NAME	RHWL (m)	D.L. (m)	WATER LEVEL 23-08-2009	WATER LEVEL 24-08-2009	+ Rise - Fall in cm	Above D.L. in cm
	BRAHMAPUTRA BASIN							
1	DHARLA	KURIGRAM	27.52	26.50	26.33	26.24	-9	
2	TEESTA	DALIA	52.97	52.40	51.99	52.00	+ 1	
3	TEESTA	KAUNIA	30.52	30.00	28.47	28.31	-16	
4	JAMUNESWARI	BADARGANJ	32.92	32.16	31.12	30.99	-13	
5	GHAGOT	GAIBANDHA	22.81	21.70	21.61	21.57	-4	
6	KARATOA	CHAK RAHIMPUR	21.41	20.15	20.53	20.52	-1	+ 37
7	KARATOA	BOGRA	17.45	16.32	14.83	14.78	-5	
8	BRAHMAPUTRA	NOONKHAWA	28.18	27.05	26.18	26.10	-8	
9	BRAHMAPUTRA	CHILMARI	25.06	24.00	23.50	23.43	-7	
10	JAMUNA	BAHADURABAD	20.62	19.50	19.29	19.23	-6	
11	JAMUNA	SERAJGANJ	15.12	13.75	13.66	13.58	-8	
12	JAMUNA	ARICHA	10.76	9.40	9.22	9.24	+ 2	
13	OLD BRAHMAPUTRA	JAMALPUR	18.00	17.00	15.77	15.81	+ 4	
14	OLD BRAHMAPUTRA	MYMENSINGH	13.71	12.50	10.70	10.79	+ 9	
15	BURIGANGA	DHAKA	7.58	6.00	4.75	4.87	+ 12	
16	BALU	DEMRA	7.13	5.75	5.14	5.22	+ 8	
17	LAKHYA	NARAYANGANJ	6.93	5.50	5.18	5.24	+ 6	
18	TURAG	MIRPUR	8.35	5.94	5.09	5.19	+ 10	
19	TONGI KHAL	TONGI	7.84	6.08	5.31	5.38	+ 7	
20	KALIGANGA	TARAGHAT	10.21	8.38	7.19	7.25	+ 6	
21	DHALESWARI	JAGIR	9.73	8.23	6.71	6.77	+ 6	
22	DHALESWARI	REKABI BAZAR	7.66	5.18	4.74	4.81	+ 7	
23	BANSHI	NAYARHAT	8.39	7.32	5.23	5.35	+ 12	

নদী বাহিত বন্যা পরিস্থিতি ও পূর্বাভাষ তথ্য
জেলা ঃ টাঙ্গাইল
তারিখ ঃ ২৯-সেপ্টেম্বর-২০০৭

নদীর নাম	স্থানের নাম	বিপদসীমা (meter PWD)	গতকালের অবস্থা	আজকের অবস্থা	২৪ ঘন্টা পরের অবস্থা	৪৮ ঘন্টা পরের অবস্থা
ব্রহ্মপুত্র	নুন খাওয়া	২৭.২৫	২৪.১৪	২৪.০০	০.০০	০.০০
ব্রহ্মপুত্র	চীলমারী	২৪.০০	২১.৫৮	২১.৪১	২১.২৭	২১.১৫
যমুনা	বাহাদুরাবাদ	১৯.৫০	১৭.৬০	১৭.৪৩	১৭.৩০	১৭.১৭
যমুনা	সিরাজগঞ্জ	১৩.৭৫	১২.৪২	১২.২৮	১২.১৫	১২.০১

উৎস ঃ এফ এফ ডব্লিউ সি, ওয়েবসাইট

Reminding people regularly through simulations and demonstrative mock drills

Encourage Volunteerism
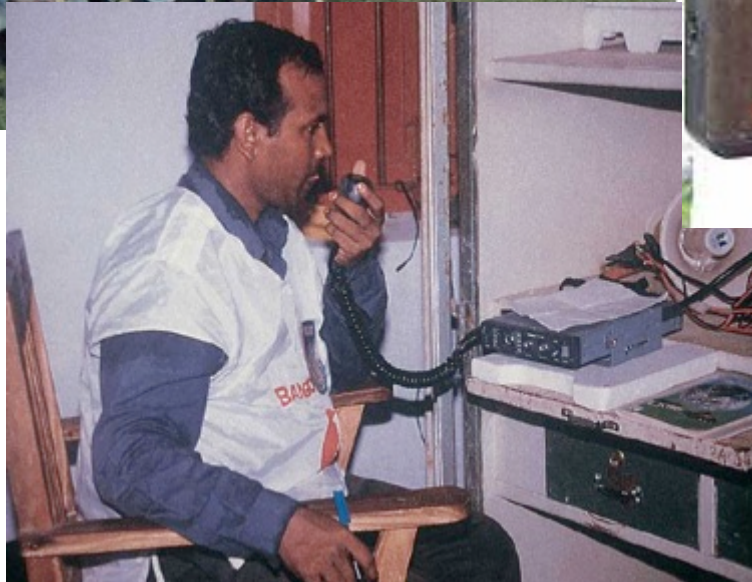
Thank You

Atiq Kainan Ahmed
Programme Specialist (Early Warning Systems), ADPC.
Email: atiqka@adpc.net

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9. Training on hazard/risk/emergency preparedness **awareness** integrated in various formal and informal educational programmes with regular drills to ensure operational readiness.

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