

Information Needs and Flow for Disaster Management

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Hazards are not necessarily to become disasters

- **Disaster reduction measures need to be taken**
 - **Before disasters**
 - Risk assessment
 - Background information base
 - Disaster modeling
 - Mitigation and response planning
 - Preparedness at national to community levels
 - **Monitoring and early warning**
 - Collect and extract disaster signals
 - Disseminate alerts to the public
 - **Response to disasters**
 - Mitigation and damage estimation
 - Mobilizing and delivering resources
 - Rescue and relief
 - **Effectiveness depends on effective uses of information and knowledge**

A digital divide indicated by the Indian Ocean Tsunami

- Immediate response to the catastrophe
 - Indian Ocean and SE Asia tsunami early warning system
- Strategic objectives
 - Multi-hazard disaster warning and management systems for knowledge based disaster management
 - Information and knowledge base
 - Information acquisition, analysis and early warning
 - Preparedness and response planning
 - Public mobilization and instruction
 - Mitigation, rescue and relief supporting tools
 - At national, sub-regional to regional levels
 - Communication networking relevant nodes and ensuring information flows among them

Information and knowledge base

- **Background information base**
 - Geo-characters, maps, digital elevation models,...
 - Demographic, economic and social data
 - Remote sensing images and related thematic maps
 - Material storage and other response resources
- **Knowledge base with decision supporting tools**
 - Vulnerability and historic disaster records
 - Disaster modeling and impact estimation
 - Mitigation and response planning, simulating and action supporting
 - Engineering measures
 - People evacuation
 - Mobilization of human and material resources
 - Rescue and relief action

Disaster management information system

- **Disaster management information supporting system should be established at national level**
 - As information and knowledge platform for integration and operation of relevant information and decision supporting tools
 - One of the most important technical bases for comprehensive, integrated Multi-hazard disaster warning and management
 - Subsystems distributed at and operated by relevant government and non-government organs as function nodes
 - Acceptance of external information and technical assistance
- **Accessible to field action centers and action teams**
 - In form of data, chart, images, flash, tele-conference, ...
 - **Through disaster communication systems**

Information acquisition, analysis and early warning

- **Realtime: observing stations to information processing centers**
 - For earthquake, tsunami, storm-surge ...
 - Ground, seafloor and sea surface based
 - Data rate: 10^3 - 10^4 bps one way, minute/hours to continuous
- **Semi-realtime: observation sites to information processing center**
 - Meteorological, hydrological & oceanographic parameters
 - Forest and grassland fire hotspots
 - Data rate: 10^3 - 10^4 bps one way, minute/hours
- **Realtime information from processing centre for early warning**
 - Analysed early warning signal
 - To disaster management authorities of national and relevant local governments
 - Data rate: 10^3 - 10^4 bps two way, whenever needed

Semi-realtime space-/air-borne remote sensing information products

- **Meteorological satellite data and thematic products**
 - Weather disasters, forest fire , ...
 - Data volume: 10^{4-7} Bytes, interval : 1 – 12 hours
- **Remote sensing satellite data and thematic products**
 - Disaster area and damage assessment
 - Data volume: 10^{6-8} Bytes, interval 6 hours to 2 days
- **Airborne survey : remote sensing image, photo, video, ...**
 - Detailed survey of disaster hit areas
 - **Realtime – special communication arrangement**
 - Data volume: 10^{6-8} bytes
- **Provided through disaster management information system**
 - Images or information extracted thematic products
 - Products provided by domestic and external sources
 - Accessible to field centres

Preparedness and response planning

- No specific communication requirement
- Emergency communication capability should be part of preparedness and response planning

Public mobilization and instruction

- Delivery of disaster warning
 - From government authorities
 - To the people in all possible affected areas
 - With clear instruction for their proper actions
- Possible communication means
 - Loudspeaker broadcast
 - Radio/TV broadcast
 - Group SMS and group e- mail
 - Remote communities: Community informing centres ?
- Data rate may be quite low, coverage should be high

Emergency communication supporting field actions (1)

- Among national disaster management HQ, local centers, field centres and field teams
- Communication among national information centres and external information service providers
 - Remote sensing products and other globally observed information
- Among HQ and local/field centres
 - Two way multimedia communication
 - Overall disaster situation and field observation reports
 - Action instructions with supporting information and thematic maps
 - Information about related operations
 - Video/audio conference
 - Data rate: 10^{5-6} bps, continuous

Emergency communication supporting field actions (2)

- **Between field centres and field action teams, and between local/field centres and material supply teams**
 - Mitigation, rescue, relief, medical services, epidemic prevention, ...
 - Field report on situation and assistance needs, actions with relevant information and maps
 - Voice and low rate data 10^3 - 10^4 bps, through cellular phone, VHF/UHF radio, satellite-mobile, ...
 - Multimedia information – WiMax at 10^5 - 10^6 bps
- **Between medical service teams (field centres) and remote hospitals**
 - Transmission of medical files, images, ...
 - Tele-conference for consultation
 - Data rate 10^5 - 10^6 bps, when needed

Bandwidth requirements of disaster communication systems (1)

- As part of disaster management infrastructure
- For information acquisition and early warning
 - Before disasters: daily normal operation
 - Monitoring data to information processing centres
 - Low bandwidth data transmission
 - For accessing satellite data products
 - Reception of broadcasted products
 - Access to on-line service: 10^{4-5}
 - During disasters response
 - For early warning information acquisition, no extra bandwidth required
 - For access to satellite image: 10^{5-6} bps
 - For access remote sensing thematic products: 10^{4-5} bps

Bandwidth requirements of disaster communication systems (2)

- For emergency response
 - Before disasters: standby, testing and maintaining, training, ...
 - During emergency:
 - High bandwidth required in limited disaster hit areas
 - Support voice, video, data, conference, ...
 - Support cellular phone
 - For field centres, $>10^5$ bps
 - For field teams: voice communication is minimum
 - In some situation, terrestrial infrastructure may be destroyed, or not provide the bandwidth
 - Rapid deployable high bandwidth connections
 - Satellite, microwave, optical fibre, ...

Satellite broadband enabled sub-regional communication supporting systems (1)

- A proposal for development and establishment of regional cooperative mechanisms on disaster communication support
- For existed disaster communication system
 - To work as a backup and complementary system
- For countries or areas without existing systems, or bandwidth can not meet the requirement
 - To form a workable operational system
- Support broadband based VPNs for
 - National disaster management information systems
 - To enhance such nodes where other connectivity could not provide sufficient bandwidth
 - Easier access to domestic and external information services
 - National emergency response services
 - Linking local and field centres, and access to national HQs
 - Providing WiMax and/or mobile to field teams

Satellite broadband enabled sub-regional communication supporting systems (2)

- With one sub-regional standby emergency communication system be shared for serving many members countries
- Satellite advantages:
 - Broad coverage
 - Shared and re-locatable bandwidth
 - Movable terminals for rapid deployment and easy installation
- Satellite broadband services become available
 - Support connection at 10^6 bps
 - Terminals and bandwidth have become quite affordable
 - Public-private partnership and big user community may make them further lowered
- Satellite resources could be provided through multi-stakeholder approach
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**Thank you for
your attention**