Adaptation Through Better Hazard Warnings: Aims of HIWeather

Brian Golding
Met Office, UK
Co-Chair, WWRP/HIWeather
Early Warnings as an Adaptation Mechanism
Safe, Resilient, Sustainable Communities

Resilience through adaptation

RISK
- Climate Change (P)
- Population (E)
- Inequality (V)
- Migration (V)
- Dependency (V)

RESILIENCE
- Understanding
- Governance
- Preparedness

Access to early warning systems, risk information and assessments
HIWeather overview
Scope defined by a set of hazards...

**Urban Flood:**
Reducing mortality, morbidity, damage and disruption from flood inundation by intense rain, out-of-bank river flow, coastal wave & surge overtopping and from consequent urban landslides.

**Wildfire:**
Reducing mortality, morbidity, damage and disruption from wildfires & their smoke.

**Disruptive Winter Weather:**
Reducing mortality, morbidity, damage and disruption from snow, ice and fog to transport, power & communications infrastructure.

**Urban Heat Waves & Air Pollution:**
Reducing mortality, morbidity and disruption from extreme heat & pollution in the megacities of the developing and newly developed world.

**Extreme Local Wind:**
Reducing mortality, morbidity, damage and disruption from wind & wind blown debris in tropical & extra-tropical cyclones, downslope windstorms & convective storms, including tornadoes.
...their impacts,

Dirty water in the “wrong” place

- Buildings damaged
- Contents destroyed
- Transport blocked
- Drowning
- Water/energy interrupted
- Business interrupted
- Bankruptcy
- Redundancy
- Food/fuel shortage
- Distress
- Illness
- Recovery cost
- Injury
- Occupants displaced
- Death

Weather triggers:
- Rain
- Snow
- Temperature
- Pressure
- Wind
- Storm surge
- Ocean Waves
- Run-off
- Drains
- River
- Breach/Overtopping
- Contamination
- Snow Melt
- Run-off
- Drains
- River

Factors:
- Depth
- Velocity
- Dirt/Trash
- Pollutants
- Contamination
- Recovery cost
- Temperature
- Snow Melt
- Snow
- Ocean Waves
- Pressure
- Wind
- Storm surge
- Surf
- Temperature
- Snow Melt
...decision makers

National Government
City/District Authorities
Emergency Managers
Fire & Rescue
Voluntary Response Sector
Infrastructure operators
Water, Energy, Telecomms operations managers
Public Services operations managers
Hospital & Ambulance operations managers
Land/Marine/Air Transport operations managers
Public event organisers
Sport organisers
Insurance Companies
Businesses
News Media
Public
...

Overview
Specific & Technical
General
...who take mitigation actions,

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<tr>
<th>Lead Time (major river &amp; coast floods)</th>
<th>-14d</th>
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<th>-7d</th>
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| Flood Warnings                       |      |      |     |     |     |     |     |      |    |      |     |     |      |
| Evacuation                           |      |      |     |     |     |     |     |      |    |      |     |     |      |
| Rescue                               |      |      |     |     |     |     |     |      |    |      |     |     |      |
| Refurbishment & Rebuilding           |      |      |     |     |     |     |     |      |    |      |     |     |      |
The Gulf coast of Florida

Outlook for days 3-5

A 10% chance of a shower

20% prob of intense rain within 30km between 1-2pm tomorrow
...and how it reaches them

Critical user
- Trusted Advisor
- Bespoke Briefing Pack
- Supporting Products

General user
- Trusted Products
- Multiple Formats
- Multiple Media
- Multiple Sources

Supporting Products

What?
- Confidence
- Medium
- Brand
- Advice
- Precision

Where?
- Duration
- Format
- Delivery
- Consistency
- When?

When?
- Support
- Interpretation
- Track record
- Consistency
- When?
Obstacles to effective mitigation...

- **not received** when, where & by whom required: media, format, lead time, preparedness
- **not understood**: format, content, language
- **not containing** required information: operational thresholds, impact information, vulnerability information, operational status, resolution
- **not believed**: track record, convergence, supporting evidence, confidence indication, training
- **not accurate**: model, initialisation, uncertainty model, coupling of hazard and impact models, resolution, observations, verification
...addressed by research in...

Applications:
- Predictability & Processes
- Multi-scale Forecasts
- Vulnerability & Risk
- Evaluation
- Communication

Interaction and Communication

with Stakeholders

Social

Economic

Environmental

Applications in the forecasting process
- Design of observing strategies
- Uncertainty
- Field campaigns & demonstrations
- Knowledge Transfer
- Verification
- Impact Forecasting
- Databases & Archiving
Areas of Mutual Interest
Research Links

- Processes & predictability: improving our models, supporting model interpretation
- Common hazards: understanding and modelling the impact chain
- Communication & response: understanding how people react to warnings and what can be done to help them make the right decisions
- Common stakeholders: NHMSs, emergency managers
HIWeather

Promote Co-Operative International Research
to achieve a Dramatic Increase
in Resilience to High Impact Weather, worldwide,
through Improving Forecasts for
timescales of minutes to two weeks,
and Enhancing their Communication & Utility,
in Social, Economic & Environmental Applications