



# ***Training Workshop on Multi-Hazard Early Warning Systems***

***with focus on Institutional Coordination and  
Cooperation***

Website: [http://www.wmo.int/pages/prog/drr/events/Pula/index\\_en.html](http://www.wmo.int/pages/prog/drr/events/Pula/index_en.html)

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## 1. Background

The training workshop on “Multi-Hazard Early Warning System with focus on Institutional Coordination and Cooperation” (hereafter mentioned as MH-EWS Training Workshop) held in Pula, Croatia (1-3 October 2009) was held as part of the World Meteorological Organization (WMO) project on “Regional Cooperation in South Eastern Europe for meteorological, hydrological and climate data management and exchange to support Disaster Risk Reduction”. This project emerged from the South East Europe Disaster Risk Mitigation and Adaptation Programme<sup>1</sup> (SEEDRMAP), initiated in 2007 by the World Bank, the WMO and the United Nations Strategy for Disaster Risk Reduction (UN-ISDR), to assist countries in reducing risks associated with natural hazards. SEEDRMAP aims at developing or strengthening national capacities in three areas: (i) Disaster risk management, institutional capacities and governance; (ii) Hydrometeorological Services; and (iii) Financial risk transfer mechanisms. During the first phase of the initiative, fact finding surveys and desk-top studies were performed to obtain information needed for the development of relevant follow-up projects, and the results have been published in four reports.<sup>2</sup> Following these assessments, WMO and the United Nations Development Program (UNDP) developed, in parallel, two complementary proposals that were funded by the European Commission (EC) Directorate General for Enlargement.<sup>3</sup> Beneficiary countries of these EC funded projects are Albania, Bosnia and Herzegovina, Croatia, the Former Yugoslav Republic (FYR) of Macedonia, Montenegro, Serbia, Kosovo (as defined by UNSCR 1244/99) and Turkey. The projects were launched in April 2009 and are expected to be completed by the end of December 2010.

As part of this project, WMO is assisting governments with the development of their Early Warning Systems (EWS) as an integral part of their disaster risk management strategies. As part of its strategy, WMO is working with its partners to link know-how, derived from good practices in early warning systems, to national and regional development projects focused on strengthening institutional capacities and cooperation of the National Meteorological and Hydrological Services (NMHS) and disaster risk management agencies. In this context, WMO has developed a systematic process for identifying and documenting good practices in EWS with focus on institutional coordination and cooperation. Based on detailed synthesis of these good practices and consultation with experts, WMO has developed a training workshop package, which was used in this training workshop.

Effective EWS are comprised of four operational components engaging coordination across many agencies to ensure that:

- Hazards are detected, monitored, forecasted, and hazard warnings are developed;
- Risks are analysed and this information is incorporated in the warning messages;
- Warnings are issued by a designated authoritative source and disseminated in a timely fashion to authorities and public at-risk; and

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<sup>1</sup> The countries involved in this initiative include Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the former Yugoslav Republic of Macedonia, Moldova, Montenegro, Romania, Serbia, Kosovo (as defined by UNSCR 1244/99), Slovenia and Turkey

<sup>2</sup> Risk Assessment for South Eastern Europe Desk Study Review, 2008; Strengthening the Hydro-meteorological Services in South Eastern Europe, 2008; Mitigating the Adverse Financial Effects of Natural Hazards on the Economies of South Eastern Europe, 2008; The structure, Role and Mandate of Civil Protection in Disaster Risk Reduction for South Eastern Europe, 2008.

<sup>3</sup> Activity 1: Building Capacity in Disaster Risk Reduction through Regional Cooperation and Collaboration in South East Europe (UNDP); Activity 2: Regional Cooperation in South Eastern Europe for meteorological, hydrological and climate data management and exchange to support Disaster Risk Reduction (WMO).

The main objective of this WMO project on “Regional Cooperation in South Eastern Europe for meteorological, hydrological and climate data management and exchange to support Disaster Risk Reduction” is to reduce the vulnerability of South Eastern Europe (SEE) to natural hazards, and address losses of life, property and economic productivity caused by weather extremes and other natural hazards. This will be achieved through two complementary sets of activities: Activities in Disaster Risk Reduction (DRR), implemented jointly with UNDP (Component 1); and Technical development of National Meteorological and Hydrological Services (NMHS) activities (Component 2).

- National and community-based emergency plans are activated in response to warnings to reduce potential impacts on lives and livelihoods.

The MH-EWS Training Workshop launched the DRR activities of the EC funded projects and was sponsored by WMO, UNDP, and the Meteorological and Hydrological Service of Croatia.

## **2. About the Workshop**

### **2.1. Goals**

The goals of the workshop were to:

- Train the participants on good practices in early warning systems from a number of countries in Europe and other regions;
- Engage the participants in moderated discussions to assess EWS capacities, gaps and needs in South East Europe (SEE) countries; and
- Identify priority areas of action for strengthening institutional cooperation and coordination in EWS among NMHS, Disaster Risk Management Agencies and other EWS stakeholders.

### **2.2. Participants**

The workshop participants included directors and/or other high-level officials from NMHS and Disaster Risk Management (DRM) Agencies from ten SEE countries, experts in early warning systems from five countries as well representatives from international and regional agencies (see participants list in Annex I). The participants represented a focused group of expertise related to different aspects of early warning systems.

### **2.3. Sessions and working groups**

The workshop included three sessions (see annotated agenda in Annex II):

**Session 1:** The opening and introduction session presented the background and objectives of the training workshop, and introduced the basic concepts of disaster risk management including risk assessment, disaster risk reduction and early warning systems as well as financial risk transfer mechanisms. The components of early warning systems and criteria for good practices as established through an extensive consultation process were also discussed.

**Session 2:** During this session, leading national experts from Cuba, United States of America, Italy, France, Germany and Croatia from disaster risk management agencies and NMHS delivered training sessions on their national early warning systems based on issues outlined in Annex III. A moderated discussion on “Capacity Development in Multi-Hazard Early Warning Systems with Focus on Institutional Coordination, and Cooperation” was held, which discussed lessons learned from these good practices, common factors that have led to their success and challenges that need to be addressed.

**Session 3:** In this session, the participants were divided into two working groups to discuss and determine common gaps and needs in early warning systems capacities including policy, legislative, institutional, operational, financial issues gaps and needs in the SEE countries. The outcomes from these working groups included recommendations for the development of national early warning systems strategies, institutional capacities and coordination mechanisms. Results from the working groups were then presented and discussed during the concluding discussions of Session 3 and recommendations for priority of actions were developed.

All presentations and documents of the workshop can be accessed at:  
[http://www.wmo.int/pages/prog/drr/events/Pula/index\\_en.html](http://www.wmo.int/pages/prog/drr/events/Pula/index_en.html).

### **3. Overall Synthesis of Presentations and Discussions**

#### **3.1. Common success factors in EWS as revealed from the good practices**

A synthesis of the good practices presented at the MH-EWS Training Workshop and examples of other EWS revealed that there are a number of common success factors in the implementation of EWS irrespective of the political and institutional factors of each country. However, implementation of the EWS and operational aspects vary across the countries, according to their specific history, culture, institutions, capacities and resources. Discussions on the presented good practices indicated that these cases share the following common principals in their EWS:

1. There is strong political recognition of the benefits of EWS and the related institutional capacities supported by effective planning and legislation at national to local levels;
2. The EWS capacities are aligned with resources across national to local levels;
3. There is effective collaboration and coordination among the agencies responsible for various components;
4. The roles, responsibilities of all the agencies involved in different aspects of EWS is defined in plans and supported by legislation and their collaboration and coordination mechanisms that are clearly defined through standard operational procedures;
5. The NMHS capacities, roles and responsibilities are clearly reflected and understood by the disaster risk management agencies and reflected in relevant policies, plans, legislation, standard operating procedures, and directives;
6. There is a clear authoritative agency responsible for the development and/or issuance of the warning;
7. In these countries:
  - a. Role of NMHS for development of warnings of different hazards is clear:
    - i. Type I hazards: NMHS has sole mandate for the development of the warning for the hazard
    - ii. Type II hazards - Has joint mandate for the development of the warning hazard for the hazard
    - iii. Type III hazards - Provides information to other agencies that have the mandate for the development of the warning for the hazard.
  - b. Hazard warnings are produced based on feedback and requirements of disaster risk management agencies to ensure clarity, and consistency;
  - c. Warnings are to level of thresholds that are developed together with disaster risk management agencies to links level-of-threat to specific emergency preparedness and response actions; and,
  - d. Warnings include information about potential impacts and associated risks.
8. Warning dissemination mechanisms are developed to ensure that:
  - a. Warnings reach authorities responsible for the activation of emergency plans from national to local levels in a timely fashion;
  - b. Warnings reach the public at risk and understood by the public;
  - c. Warning messages are prepared in collaboration with disaster risk management agencies to provide the public with guidance on actions that need to be undertaken; and,
  - d. Communication mechanisms are reliable, redundant and sustainable over time based on the available resources.
9. Emergency response plans are targeted to needs of the authorities and emergency responders and communities addressing issues such as population density (city vs. rural areas), cultural diversity, and vulnerable segments such as the women, children, elderly and the disabled;
10. The NMHS and the disaster risk management agency have clearly established collaboration through programmes engaging staff of both agencies. They collaborate on an

- on-going basis to develop and improve the operational systems as well as prior, during and after each event to support all stages of preparedness, response and recovery through provision of watches, alerts, warnings and other forecast products;
11. NMHS have dedicated meteorologist to interface with disaster risk management authorities and staff on an on-going basis and during events.
  12. Training and educational programmes are:
    - a. Conducted regularly among staff of NMHS and disaster risk management agencies from national to local levels;
    - b. Targeted at public in the areas of risk awareness and emergency response actions (e.g., through school curricula, community activities);
  13. Effective feedback and improvement mechanisms are in place throughout all levels of the EWS to provide valuable input and system improvement over time.

### **3.2. Discussions and challenges in the SEE region**

Many countries in the SEE region are in the process of restructuring their disaster risk management policies, plans and strategies, and appropriate coordination mechanisms engaging relevant ministries and institutions. However, level of cooperation and coordination between National Meteorological and Hydrological Services (NMHS) and Disaster Risk management (DRM) varies from country to country depending on their institutional infrastructure, capacities, and priority areas of action.

In this context, the presentations of the good practices fostered a productive discussion among the representatives from NMHS and disaster risk management agencies of the SEE countries at the workshop. These discussions highlighted their challenges, gaps, needs and priorities in disaster risk reduction including EWS as summarised in the following key points.

**Multi-sectoral risk assessment and planning is a key driver in the region and could attract the interest of decision-makers to support the financing of DRR activities.**

EWS should be considered an integral part of the national DRR strategies and programmes. During the workshop it was discussed that, in most SEE countries, economic losses in many sectors caused by hydrometeorological related hazards is a key concern to the governments (e.g., agriculture, tourism, transportation, water, health, etc.). It was suggested that DRR capacity development in the SEE region should take a multi-sectoral risk management and planning approach.

**A number of countries in the region are currently restructuring their DRM processes, coordination, policies and strategies. This is an opportunity to foster institutional coordination and collaboration among NMHS and various partners in this area.**

The workshop acknowledged that there is a need for clear coordination across a network of institutions supported by clear plans, and legislation that clearly defines roles and responsibilities of different agencies. In this regard, the role of NMHS in supporting DRM needs to be identified and clearly stated in plans and documents. It was recognised that there is currently a trend to include the NMHS in the national disaster risk management structures, as most countries are moving forward from post disaster response to preventive and preparedness strategies. However, the workshop also highlighted that NMHS capacities should be evaluated and strengthened to ensure that they can support various information needs of various areas of DRM (risk assessment, EWS, sectoral planning and financial risk transfer markets such as weather-indexed insurance).

**Capacities of NMHS in producing forecast and warning for natural hazards varies across countries in the region.**

It was discussed that there is need for improving coordination and operational cooperation with DRM agencies, and develop clear guidelines to ensure that warnings trigger emergency preparedness and response actions. Public and officials' trust in warnings and credibility of the NMHS was highlighted as an area that required more attention. A number of challenges were identified by the participating NMHS, including development of sustainable and institutionalised feedback mechanisms for improving NMHS warnings and other information products, improved

relations with media, issuance of hazard warnings by the private sector, and other technical aspects.

**Cooperation at the regional level is critical and could improve EWS capacities of the SEE countries.**

The participants highlighted the need to improve regional cooperation in areas such as research, risk assessment, hazard monitoring and data sharing, modelling and forecasting, and alignment of DRM and warnings protocols across borders and with the rest of Europe. In this context, the Sub-regional Climate Center in Serbia and the Regional Drought Management Centre in Slovenia, and bi- and multi-lateral MoUs in the region were highlighted, but stressed that they need to be strengthened and expanded.

#### **4. Recommendations for next steps**

The participants of the training workshop strongly endorsed the approach of the project, and will actively participate in future DRR activities planned under the EC DG Enlargement funded projects of WMO and UNDP. They were informed of different stages of the project, including:

- Two training workshop targeted at flood and drought specialists data, metadata and mapping tools;
- National Disaster Risk Reduction Policy Dialogues in each country; and
- The development of national DRR development and regional cooperation proposals.

Evaluation results indicate high level of satisfaction of participants with this workshop. More information of participant's feedback and evaluation is available on the workshop's website.

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## **Annexes**



**ISSUES DISCUSSED IN PRESENTATIONS AND WORKING GROUPS**

**Table 1: Aspects of Early Warning Systems presented and discussed during the Multi-Hazard Early Warning Systems Training Workshop**

<b>1 Background in the establishment of early warning systems in your country</b>	
<b>2 Governance and Institutional Arrangements (national to local levels)</b>	
2.1	Policy, intutional and legal frameworks to support emergency planning and response
2.2	National to local emergency planning and related linkages to early warning systems
2.3	Organizational structure for implementing the plans
2.4	Institutional capacities and concept of operations (coordination and operational collaboration)
2.5	Utilization of a multi-hazard approach
2.6	Key factors considered for sustainability of different components of early warning systems with a multi-hazard approach
<b>3 Utilization of risk information in emergency planning and warnings</b>	
3.1	Organizational responsibilities and arrangements for the development of risk information
3.2	Hazard assessment, quantification and mapping (national to local)
3.3	Assessment of vulnerabilities and exposure (national to local)
3.4	Storage and accessibility of disaster and national hazard risk information
3.5	Development and utilization of hazard/risk information to support emergency planning and warnings
<b>4 Hazard Monitoring, forecasting, and mandates for warning development</b>	
4.1	Organizational responsibilities for monitoring, forecasting and development of hazard warnings
4.2	Organizational collaboration and coordination for development of hazard warnings
<b>5 Development of understandable, authoritative, recognizable and timely warnings</b>	
5.1	Warning message development cycle
5.2	Warning message improvement cycle
<b>6 Warning dissemination mechanisms</b>	
<b>7 Emergency preparedness and response activities (national to local)</b>	
7.1	Disaster preparedness and response planning and emergency response activation
7.2	Community response capacities
7.3	Public awareness and education
<b>8 Development of warnings and related products and services for the disaster risk management user community</b>	
<b>9 Improvement of overall operational framework of early warning systems</b>	
<b>10 Examples of previous events where the operational early warning systems has led to improvements in emergency preparedness and prevention</b>	