



Moving towards health risk reduction related to disasters with GIS risk mapping

IDRC 2008



World Health Organization

Outline of the presentation

- **The context**
- **The WHO e-atlas of Disaster Risk for the Eastern Mediterranean Region**
- **The Vulnerability and Risk Analysis & Mapping platform (VRAM)**
- **Conclusion**



The context

Large diversity of crisis...



The context

...increasing impact...

Some examples:

- **Lebanon Crisis** :\$5+ million, 900,000 people affected
- **Pakistan Earthquake**: \$15+ million, 3.2 million people affected, up to 80% health infrastructure destroyed (35 Field hospitals, 150 basic health units, over 600 medical teams)
- **Darfur Crisis**: \$20+ million, 4 million people affected
- **Iraq Crisis**: \$100+ million, 25 million people affected



The context

...but often low level of preparedness

Although 95% had experienced disasters in the past , however ...

... The follow was not existing:	% (out of 20 countries)
National policy or higher committee	30
Health sector plan for emergency response	30
Mitigation measures for health facilities	50
Community involvement	30
Standard Operating Procedures for response	60
National Disaster database of hazards and risks	60
Donor cooperation and resource mobilization	65
Human resources strategy (training)	65

✓ 20 countries (Health Survey in the EM Region, Assessing the level of National Disasters preparedness)

The context (WHO)

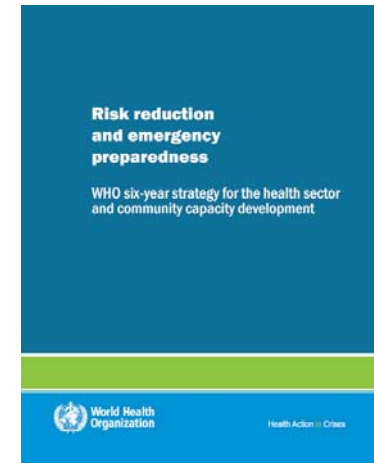
Strategic framework (WHA 2005)

“Urging all Member States to build up the national capacity for emergency preparedness and disaster reduction/mitigation and response, in order to reduce avoidable mortality and disability”

Technical framework (6 year strategy)

$$\text{Risk} = \frac{\text{Hazard} \times \text{Vulnerability}}{\text{Level of Preparedness}}^*$$

*adapted from UNDRO (1991)



The WHO e-atlas of Disaster Risk for the Eastern Mediterranean Region

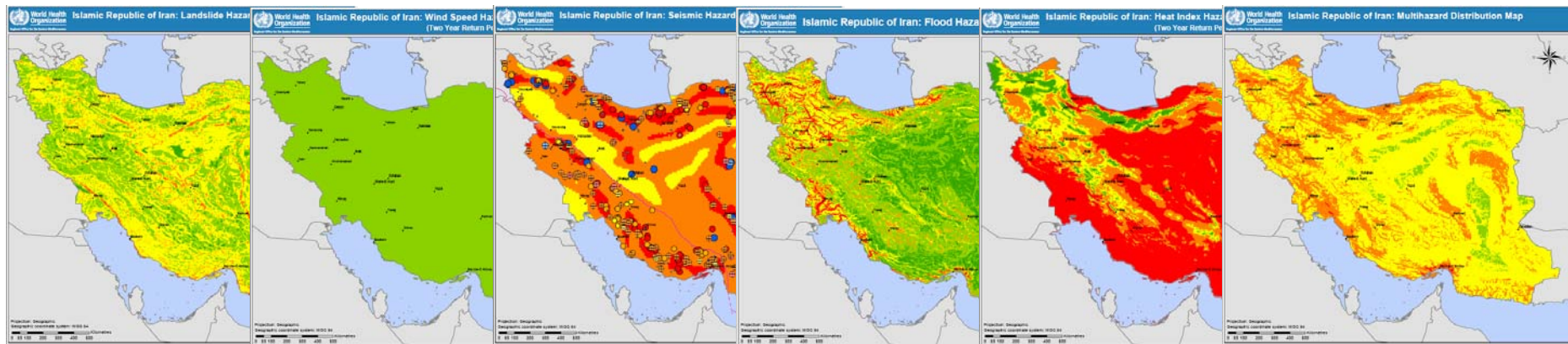
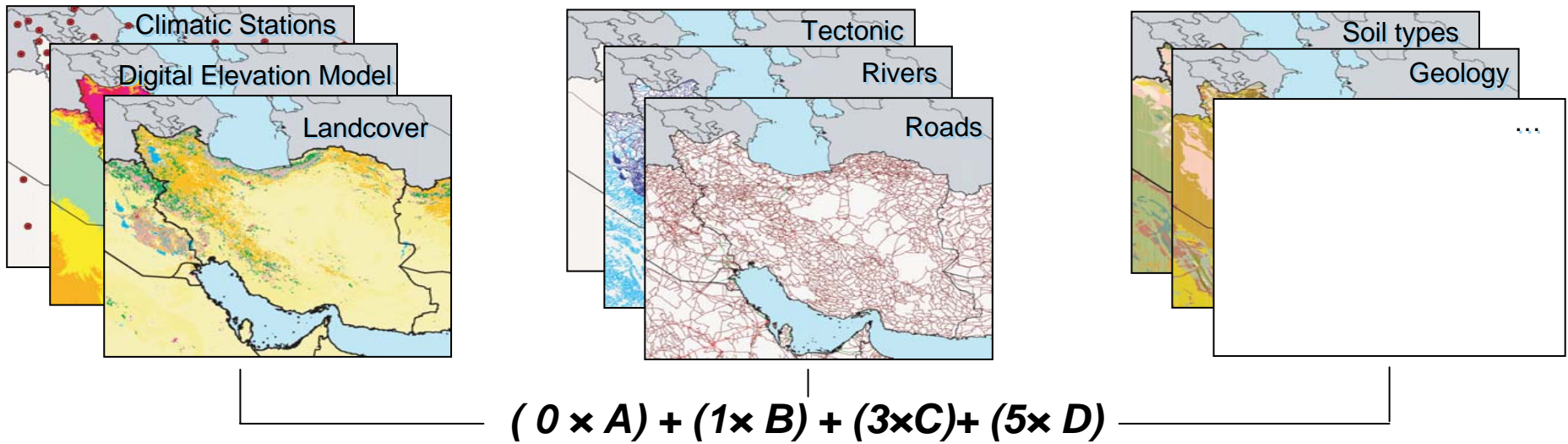
- ➔ Development of the e-atlas of disaster risk for the Eastern Mediterranean Region with the objectives to:
- encourage and stimulate Ministries of Health and other stakeholders within the health community to improve their disaster management capacity.
 - advocate for resources to improve disaster preparedness in the health sector; aid emergency response measures through better baseline information; assist in identifying, planning and prioritizing areas for mitigation activities to minimize the effects of natural hazards and provide a springboard for transitional and early recovery activities after an emergency.
- ➔ Use geography and GIS as the platform for the integration of the different data, their analysis and, ultimately, the development and application of disaster risk models

The WHO e-atlas of Disaster Risk for the Eastern Mediterranean Region

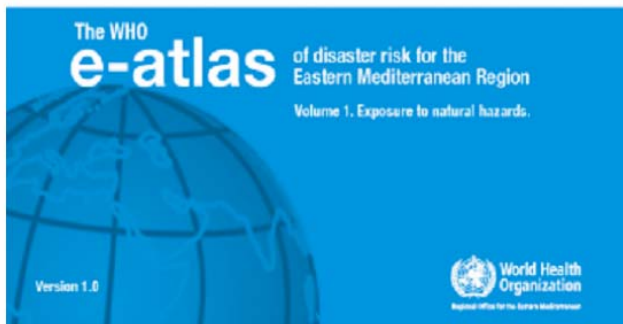
- ➔ Looked at the work already done to see if dataset and/or methods spatialising natural hazards were already existing
- ➔ Apart for seismic hazards, the material found through a literature review was presenting several limitations in terms of resolution of the final dataset and/or of the parameters which have been taken into account
- ➔ Decided to develop new models for 4 additional natural hazards (landslides, floods, heat and wind speed + multi hazard maps)
- ➔ Look for the necessary data and homogenized it for the all EM region (21 countries)
- ➔ Applied the models



The WHO e-atlas of Disaster Risk for the Eastern Mediterranean Region



The first volume of the WHO e-atlas of Disaster Risk



Islamic Republic of Iran: Flood Hazard Distribution Map

Landslide Hazard Distribution Map

Source data, resulting grids and population exposure distribution

Hazard distribution grids and population exposure distribution

The unclassified (GIS format) and application of the different models

International Journal of Health Geographics

Methodology: Modelling the spatial distribution of the natural hazards in the context of the WHO/EURO Atlas of Disaster Risk as a step towards the reduction of the health impact related to disasters

Zahed H. Abidine H. Mojtami*, Steve Eberhart*, John Boock*, Eman Abdel-Chatte* and Ahmad Nassari*

Abstract: This study aims to model the spatial distribution of the natural hazards in the context of the WHO/EURO Atlas of Disaster Risk as a step towards the reduction of the health impact related to disasters. The study is based on the use of GIS and remote sensing data. The results show that the spatial distribution of the natural hazards is highly heterogeneous and that the population exposure to these hazards is also highly heterogeneous. The study concludes that the use of GIS and remote sensing data is a valuable tool for the assessment of disaster risk and for the development of disaster risk reduction strategies.

Links

This section gives access to different web sites and journals of potential interest to the users of the Atlas.

1. Programmatic, institutional, country working on natural disaster risks (by alphabetical order)

2. Journals of potential interest to the users of the Atlas

3. Journals of potential interest to the users of the Atlas

4. Journals of potential interest to the users of the Atlas

5. Journals of potential interest to the users of the Atlas

6. Journals of potential interest to the users of the Atlas

7. Journals of potential interest to the users of the Atlas

8. Journals of potential interest to the users of the Atlas

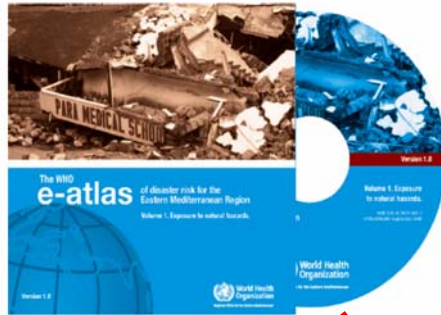
9. Journals of potential interest to the users of the Atlas

10. Journals of potential interest to the users of the Atlas

Total and percentage of population exposed by level of intensity for each hazard

Level of intensity	Seismic hazard	Flood	Landslide	Wind speed 2 year return period	Wind speed 5 year return period	Wind speed 10 year return period	Heat 2 year return period	Heat 5 year return period	Heat 10 year return period	Multihazard
Very low	58,764,073 (11%)	82,454,233 (16%)	21,901,337 (4%)	1,303,573 (<1%)	44,824 (<1%)	3,095 (<1%)	18,247,330 (3%)	11,528,966 (2%)	7,793,775 (2%)	13,912,160 (3%)
Low	99,483,154 (18%)	167,829,117 (31%)	195,018,907 (36%)	622,248,012 (96%)	343,747,929 (63%)	142,594,875 (26%)	6,636,840 (1%)	4,267,990 (<1%)	3,608,568 (<1%)	108,008,311 (20%)
Medium	266,329,883 (49%)	161,208,243 (30%)	286,620,685 (53%)	17,628,129 (3%)	197,137,602 (36%)	395,401,396 (73%)	17,376,197 (3%)	9,532,584 (2%)	6,956,737 (1%)	293,710,859 (54%)
High	93,355,982 (17%)	94,892,245 (17%)	33,487,327 (6%)	101 (<1%)	249,457 (<1%)	3,179,758 (<1%)	123,697,894 (23%)	30,731,757 (6%)	17,664,031 (3%)	120,112,129 (22%)
Very high	22,102,085 (4%)	30,781,776 (6%)	221,082 (<1%)	0 (0%)	0 (0%)	718 (<1%)	379,335,467 (70%)	465,118,509 (90%)	504,866,701 (93%)	1,162,730 (<1%)
No data	2,678,313 (<1%)	4,737,846 (<1%)	4,444,124 (<1%)	623,643 (<1%)	623,643 (<1%)	623,643 (<1%)	623,642 (<1%)	623,642 (<1%)	623,642 (<1%)	4,798,184 (<1%)

The first volume of the WHO e-atlas of Disaster Risk



$$\text{Risk} = \frac{\text{Hazard} \times \text{Vulnerability}}{\text{Level of Preparedness}}$$

**Vulnerability and Risk
Analysis & Mapping platform**

The Vulnerability and Risk Analysis & Mapping platform (VRAM)

Objectives

Support countries in developing the capacity to assess health risks (mortality, morbidity and disability) and incorporate the results in emergency and response preparedness planning.

As its knowledge base grows, VRAM's goal is to become a network of excellence in assessing health-related vulnerabilities and risks as well as a technical platform whose expertise can be utilized effectively by various partners (governments, UN and research organizations, NGOs or others) at an affordable cost.

The Vulnerability and Risk Analysis & Mapping platform (VRAM)

Activities

To achieve its objectives, VRAM is building long-term collaborative relationships with government authorities and technically capable research institutions and universities both internationally and within targeted countries in order to:

- conduct and facilitates detailed assessments of potential hazards, associated health vulnerabilities, and emergency preparedness in countries most at risk,
- develop and share methods, protocols and tools for the collection, analysis and mapping of health hazards, vulnerability and risk information taking climatic changes into account,
- develop and make available tools for evidence based decision making,
- provide the necessary training and in country capacity that will allow countries to implement the VRAM process,

The Vulnerability and Risk Analysis & Mapping platform (VRAM)

Activities

- promote and propagate the methodologies and best practices,
- create and maintain of a network of institutions working in health hazard, vulnerability and risk as an integrated part of the platform and ensure the link with the networks already existing in other sectors.

To avoid duplicating the efforts of other agencies and reduce the burden placed on countries, primary data collection will be reduced to the minimum. Emphasis will be on review and use of secondary information that is already available and on establishing partnership with the other institutions involved in primary data collection (WFP for example).

➔ Long term in countries capacity building

The Vulnerability and Risk Analysis & Mapping platform (VRAM)

Process

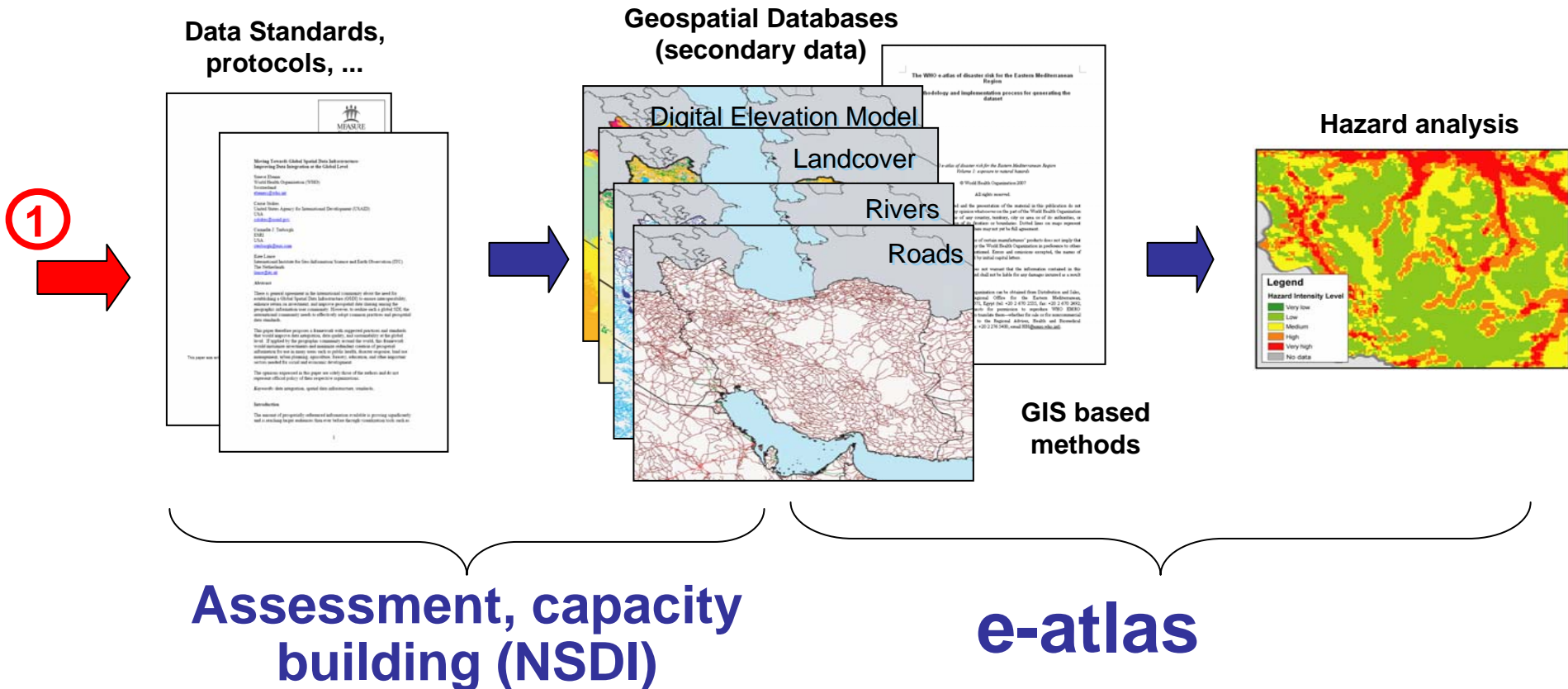
The VRAM process is to answer the following questions:

1. What are the hazards to which the population and/or the health infrastructures are exposed?
2. Where are the most vulnerable populations and health infrastructures taking susceptibility and resilience into account ?
3. Where are the population and infrastructures most at risk ?
4. What are the potential gaps in health emergency management capacity and how to address them?
5. What are the most effective/cost-effective solutions available to decision makers to fill these gaps ?

➔ Geography as the integrating platform

The Vulnerability and Risk Analysis & Mapping platform (VRAM)

Hazard analysis



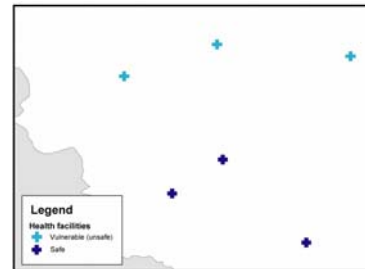
The Vulnerability and Risk Analysis & Mapping platform (VRAM)

Vulnerability analysis

Health infrastructures



**Hospital
Safety
Index**



Population

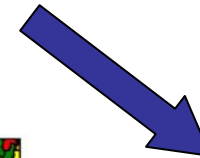
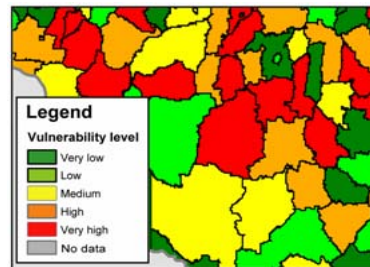
Secondary
data
collection

Socio-economic
+ health
indicators

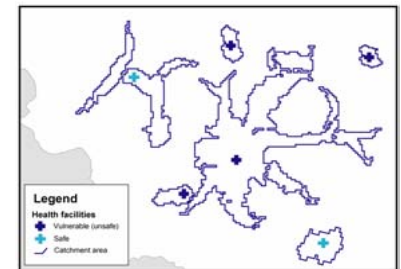
Accessibility to
health care



SALB

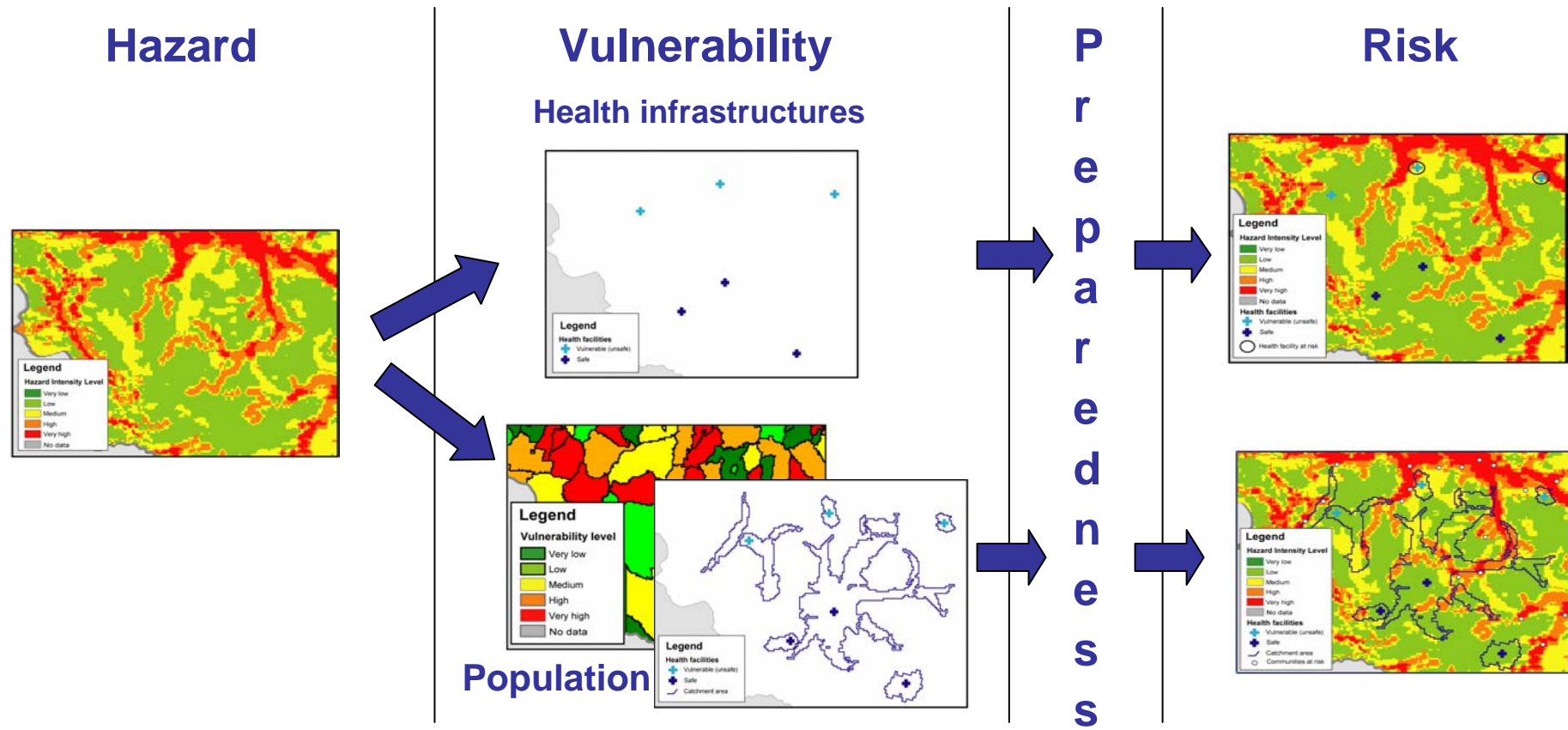


AccessMod



The Vulnerability and Risk Analysis & Mapping platform (VRAM)

Risk analysis



Conclusion

- **WHO, through the establishment of the VRAM platform which includes the e-atlas is proposing an integrated and systemic approach aiming at developing capacities in countries to conduct health risk assessments and translate them into planning**
 - **using geography / GIS as an integrating and analysis platform**
 - **leveraging what is already existing**
 - **concentrating new developments in the areas of vulnerability and risk analysis as well as decision making support**
 - **closing the emergency cycle (preparedness – response - recovery)**
- **All what I have presented remains at the brainstorming / consultation stage**
 - ➔ **A lot already exist and remains to be done**
 - ➔ **I am here to invite for comments, feedbacks, expertise, collaboration, partnership,...**

Thank you for your attention



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Copies of the e-atlas DVD: eha@emro.who.int

SALB: http://www.who.int/whosis/database/gis/salb/salb_home.htm

AccessMod: <http://www.who.int/kms/initiatives/accessmod/en/index.html>