# 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...

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# 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)

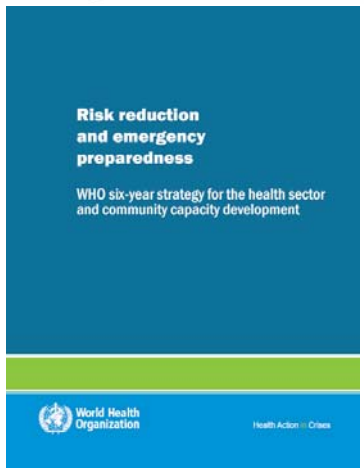
## Strategic framework (WHA 2005)

*"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)

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

*adapted from UNDRO (1991)



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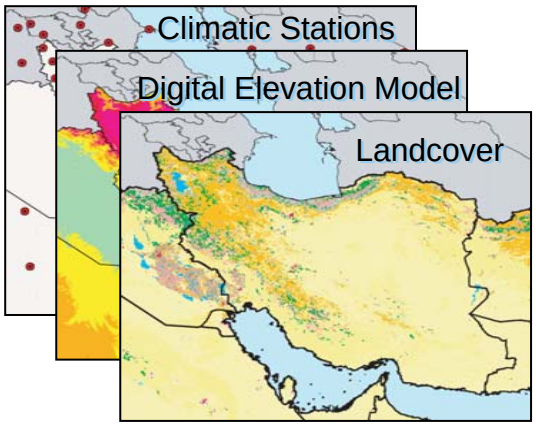
# The WHO e-atlas of Disaster Risk for the Eastern Mediterranean Region

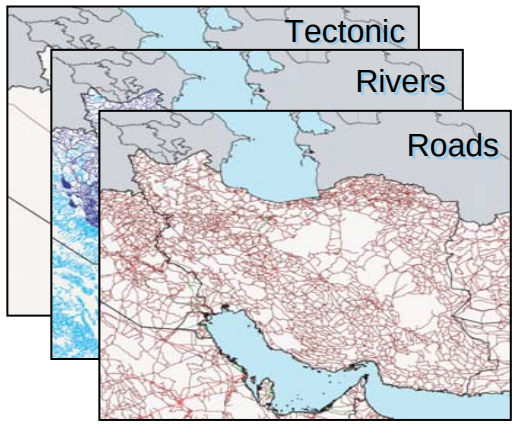
- **Development of the e-atlas of disaster risk for the Eastern Mediterranean Region with the objectives to:**
  - **encourage and stimulate Ministries of Health and other stakeholders within the health community to improve their disaster management capacity.**
  - **advocate for resources to improve 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**

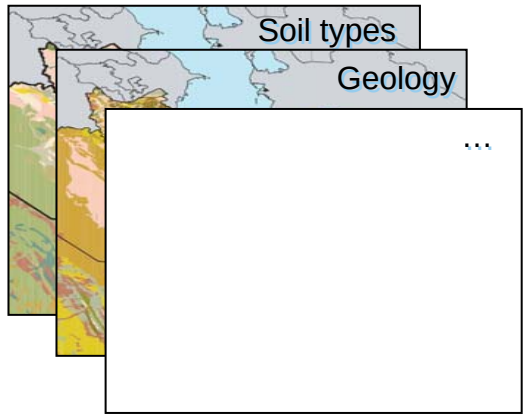
# The WHO e-atlas of Disaster Risk for the Eastern Mediterranean Region

- **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**

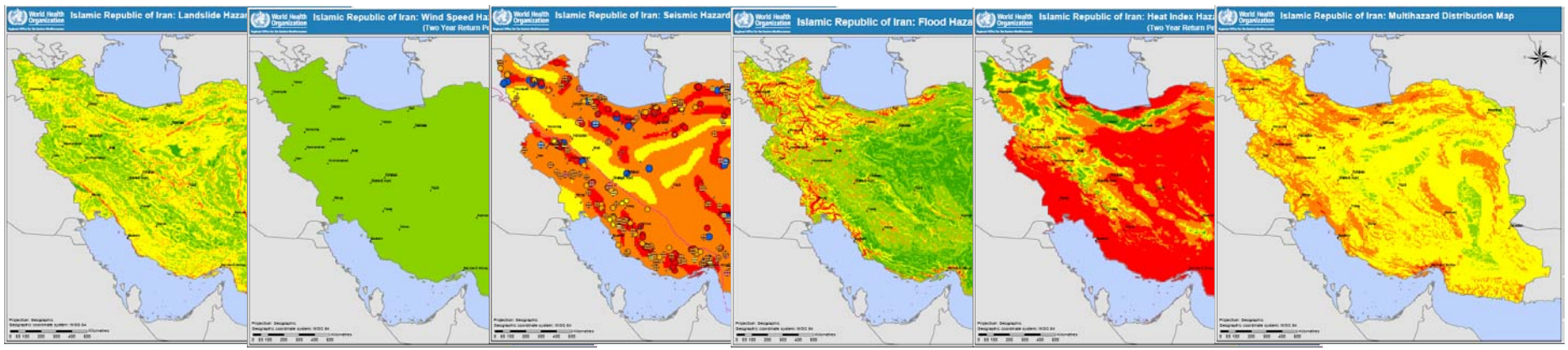
# The WHO e-atlas of Disaster Risk for the Eastern Mediterranean Region




$$( 0 \times A) + (1 \times B) + (3 \times C) + (5 \times D)$$



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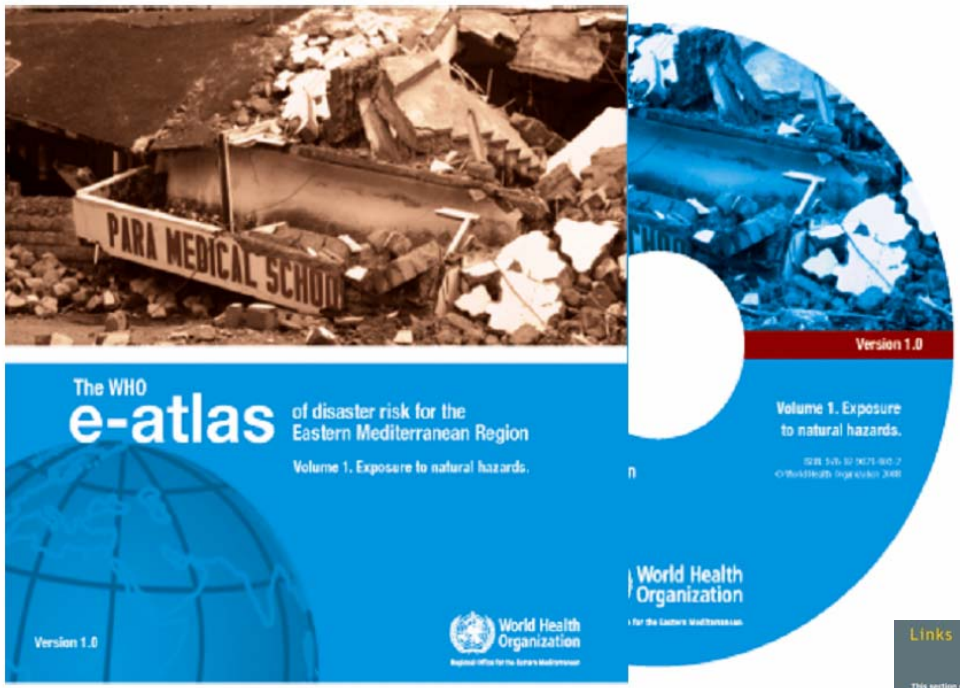
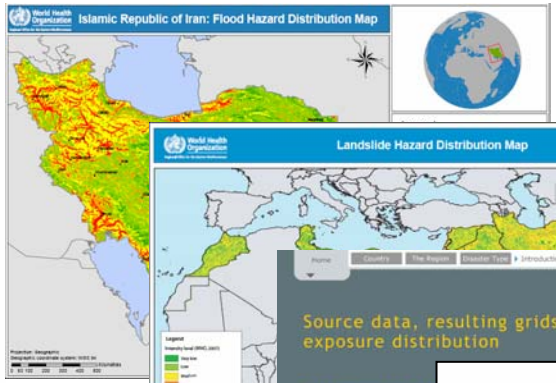
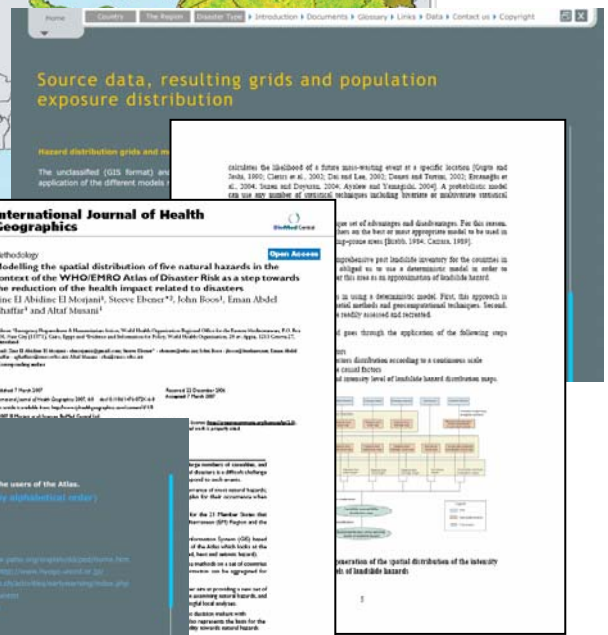
# The first volume of the WHO e-atlas of Disaster Risk









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 | 58,754,073 (11%) | 82,454,233 (15%) | 21,901,337 (4%) | 1,303,573 (<1%) | 44,824 (<1%) | 3,095 (<1%) | 16,247,330 (3%) | 11,526,996 (2%) | 7,793,775 (2%) | 13,912,150 (3%) |
| Low | 99,483,154 (18%) | 167,829,117 (31%) | 195,018,907 (36%) | 522,248,012 (96%) | 343,747,929 (63%) | 142,594,875 (26%) | 6,636,840 (1%) | 4,267,990 (<1%) | 3,808,568 (<1%) | 108,008,311 (20%) |
| Medium | 265,329,863 (49%) | 161,208,243 (30%) | 286,620,685 (53%) | 17,628,129 (3%) | 197,137,602 (36%) | 395,401,386 (73%) | 17,376,197 (3%) | 9,532,564 (2%) | 6,956,737 (1%) | 293,719,958 (54%) |
| High | 93,355,962 (17%) | 94,892,245 (17%) | 33,497,327 (6%) | 101 (<1%) | 249,457 (<1%) | 3,179,758 (<1%) | 123,697,694 (23%) | 30,731,757 (6%) | 17,664,031 (3%) | 120,112,129 (22%) |
| Very high | 22,102,095 (4%) | 30,781,775 (6%) | 221,082 (<1%) | 0 (0%) | 0 (0%) | 718 (<1%) | 379,335,467 (70%) | 485,118,509 (90%) | 504,966,701 (93%) | 1,162,730 (<1%) |
| No data | 2,678,313 (<1%) | 4,737,846 (<1%) | 4,444,124 (<1%) | 523,843 (<1%) | 523,843 (<1%) | 523,843 (<1%) | 523,842 (<1%) | 523,842 (<1%) | 523,842 (<1%) | 4,788,184 (<1%) |



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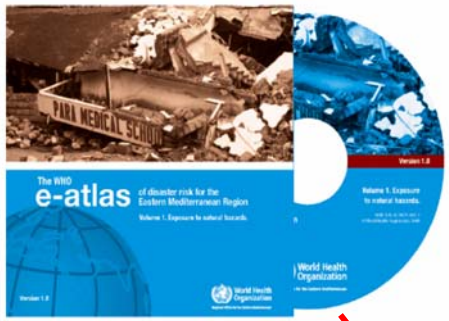
# The first volume of the WHO e-atlas of Disaster Risk




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

**Vulnerability and Risk Analysis & Mapping platform**



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# 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

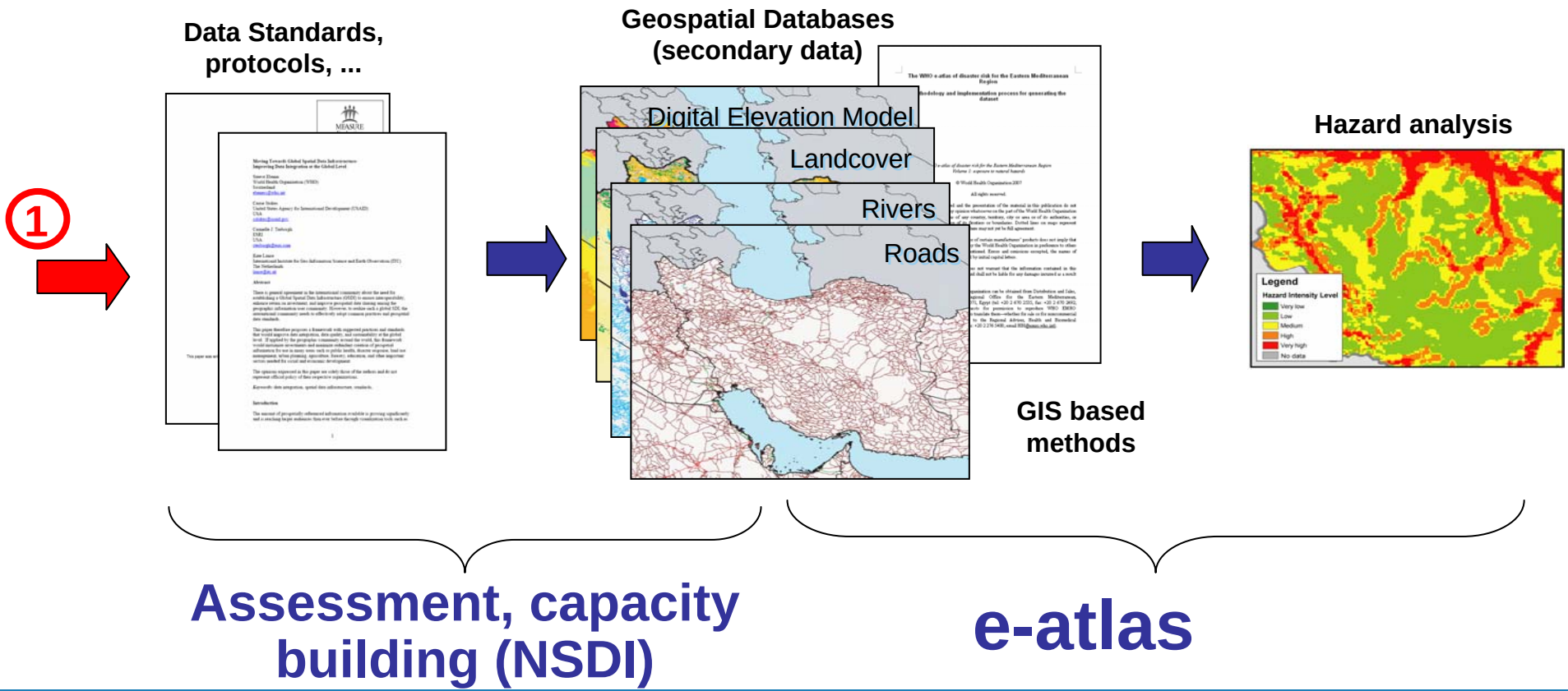
**The VRAM process is to answer the following questions:**

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



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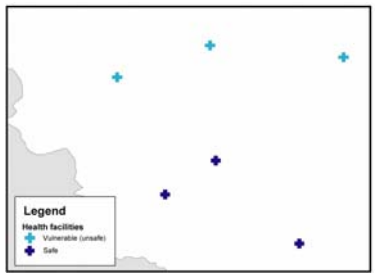
# The Vulnerability and Risk Analysis & Mapping platform (VRAM)

## Vulnerability analysis

### Health infrastructures

**Hospital Safety Index**



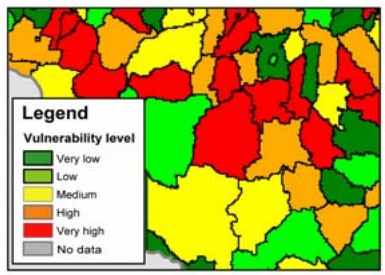

### Population

**Secondary data collection**

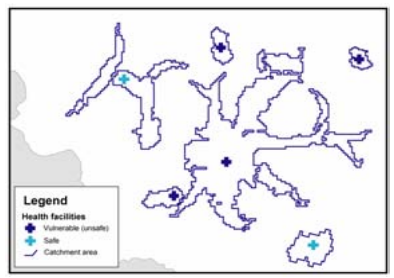
**Socio-economic + health indicators**

**Accessibility to health care**

**SALB**




**AccessMod**



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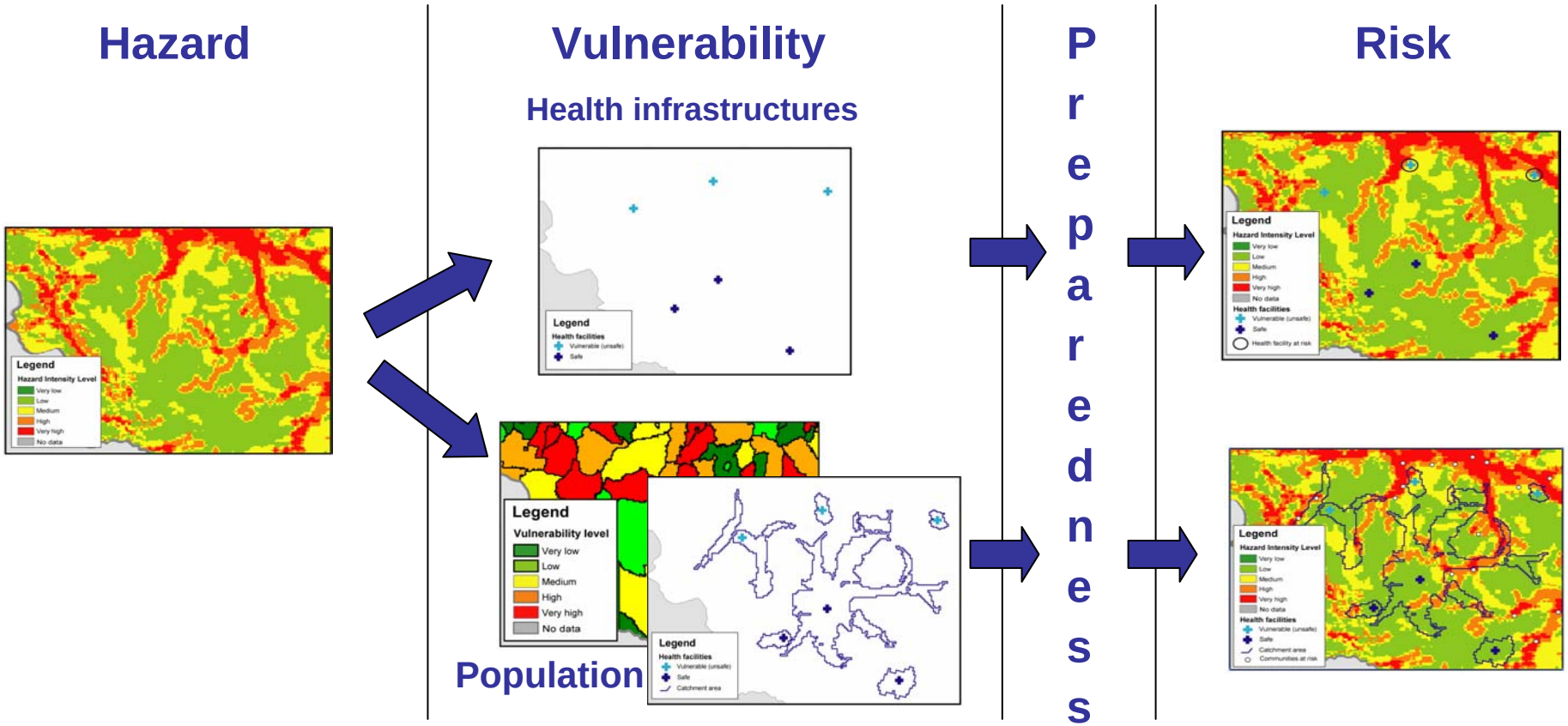
# The Vulnerability and Risk Analysis & Mapping platform (VRAM)

## Risk analysis



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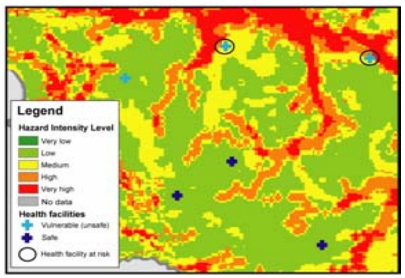
# The Vulnerability and Risk Analysis & Mapping platform (VRAM)

## Planning, baseline, capacity building

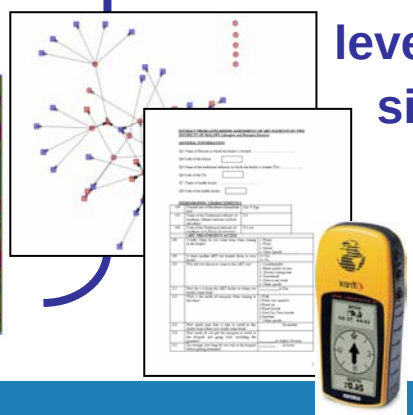
Risk

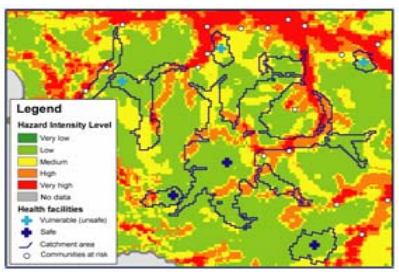



Decision making support tool → Scenarios → Emergency preparedness/ RR plan

!

Community level sur. sites






through time → Baseline for WHO's interventions

Capacity building ①



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

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