Building on the results of the project EO2HEAVEN: towards a cholera early warning system

Kym Watson, Fraunhofer IOSB, Germany
EO2HEAVEN Coordinator

GEO X, EU Side Event
Geneva, Switzerland, 14.01.2014
Project Facts and Figures

- **EO2HEAVEN**: Earth Observation and ENVironmental modelling for the mitigation of HEAlth risks
- **EU FP7 Theme 6 Environment** (including Climate Change)
- **Contribution to GEO SBA Health**
- **Coordinator**: Fraunhofer IOSB
- **13 multidisciplinary partners** (3 in Africa)
- **Duration**: 02/2010 – 05/2013
- **Budget ~8.7 M€, EU-funding ~6.3M€**

Further Information: www.eo2heaven.org
EU FP7 Project EO2HEAVEN studies impact of environmental factors on health.

- **Earth Observations**
- **Health Data**

**Web-Enabled Processing, Modelling and Fusion**

- **Air Quality and/or Aeroallergens**
  - Durban, Saxony
  - Image: UKZN

- **Water Borne Disease cholera**
  - Uganda
  - Image: S. Woodborne, CSIR
Making the results sustainable

- Capacity building with stakeholders
- Open specifications and best practices
  - Spacial Information Infrastructure for health & environment data
  - OGC Best Practices to facilitate usage of SOS service
  - Microbiological sampling
- Software Components as open source
- Collaboration with organizations in GEO Health & Environment CoP
- Participation in OGC DWG Health
One Health Aspects for cholera

- Climate-water-health nexus
- Water-microbiology-food-health chain
- Outbreaks depend on socio-economic factors

Exposure
Population at Risk

Host + Agent + Environment = Incidence of Disease

Microbiological Agent

Ecological Environment

Not yet fully understood

Figure: KIT / EO2HEAVEN
Global risk assessment: GEO, GFCS etc.

Cholera outbreaks in areas where WASH coverage is poor, and more likely with higher precipitation anomalies

Source: WHO
GIMS: Integrating WASH, Health and Environment

WHO Global Information Management System on Health and Environment

Environmental perturbations: CC/CV etc.

WASH access: (pre and post MDG)
- Access to water and sanitation data
- Levels of access by socio-economic strata

WASH policy and financing
- WASH financing and policy data
- Official Development Assistance data from donors

Health (& socio-economic) outcomes

GIMS project lead: Rifat HOSSAIN (hossainr@who.int)

Source: WHO
Bringing NOAA Capacity to Health:

The NOAA-wide One Health Group will advance NOAA’s science and services to inform health decisions through:

improved understanding of the linkages between environmental conditions and health outcomes, and
delivery of useful prediction products, data and tools

<table>
<thead>
<tr>
<th>NOAA Capacity</th>
<th>Health Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data, Observations and Monitoring</td>
<td>NOAA One Health Strategy</td>
</tr>
<tr>
<td>Forecasts and Warnings</td>
<td>Early Warning Systems</td>
</tr>
<tr>
<td>Climate Predictions and Scenarios</td>
<td>Ecological Forecasting</td>
</tr>
<tr>
<td>Research and Modeling</td>
<td>Federal, State, Local and International Partners and end users (WHO, EU, JRC, GEO, Centers for Disease Control, NIH)</td>
</tr>
<tr>
<td>Operational products</td>
<td></td>
</tr>
<tr>
<td>Health Needs for NOAA</td>
<td></td>
</tr>
</tbody>
</table>
Requirements

- Flexible framework to integrate data and models for scientific analysis
  - Environmental and socio-economic factors needed in models
- Better case surveillance
  - Links between neighboring areas
  - Improve response
Improving case reporting: mobile app *Dira*

**Disease incidence reporting application (Dira)**

1. Standardized data entry
2. Reliable data transfer
3. Integrated into existing workflows
4. To interoperate with national systems mTRAC, DHIS
Dira: Visualization of patient movement
Components of a Cholera Early Warning System

Population
Demographics, Transportation and Migration

Epidemiological Surveillance

Ocean, Climate and Environmental Observation, Monitoring and Forecasts

Social and Behavioral Factors

Additional Sampling, Sensing

Predictive Models

Risk Analysis, Vulnerability Assessment

Disease Watch Early Warning

Response Strategy

Communication and Action

Evaluation and Feedback

Source: Trtanj, J., J Davis and T. Collier 2010
Outlook

Multidisciplinary Team formed to develop a cholera Early Warning System:

- Building on
  - WHO GIMS, NOAA environmental services and Fraunhofer ICT system skills
  - EO2HEAVEN results and NOAA work in US coastal regions
  - Cholera research of Berg-en-Dal group

- Ready for funding to realize sustainable, operational Early Warning System for any interested country
See also GEO Side Event on
Global Initiative for Cholera Early Warning.
14.01.2014, 13.30-14:40, Room 13, Level 2,

Thank you for your attention

Kym Watson
Fraunhofer Institute of Optronics,
System Technologies and Image Exploitation
IOSB Karlsruhe, Germany
kym.watson@iosb.fraunhofer.de