

## UNISDR Scientific and Technical Advisory Group Case Studies - 2015 Modelling tools and capacity building in climate and public health

### The problem

The International Centre for Theoretical Physics (ICTP) training activity on 'Modelling tools and capacity building in climate and public health' is an associated course of the International Research Institute for Climate and Society (IRI) course on Climate Information for Public Health<sup>1</sup>. This grew out of the recognition of major gaps in the knowledge, methodologies, tools, data and resources available to the public health community in their quest to better manage climate-related risks to improving public health outcomes. The gaps identified include a deficit in educational and practitioner texts, tools, methodologies and data that can be used to build an appropriate evidence-base of the value of climate information to the public health sector<sup>2</sup>. To meet this need, the IRI and its associated courses started to train a new generation of leaders to understand the role that climate plays in driving disease burden and impacting economic growth<sup>3</sup>. Such capacity building will help to strengthen and improve decisions made in the public health sector to minimise the impacts of global environmental change.

### The science

Training activities are usually run over a two week period and are broadly structured as follows:

- Fundamentals of climate and public health interactions.
- Tools to analyse climate, environmental and public health data.
- Environmental epidemiology.
- Statistical and dynamical disease modelling.
- Development of participant projects.

The objective of the first module is to understand the value of applied public health surveillance and to identify opportunities where climate data can enhance surveillance quality. A practical introduction to climate observations and model output databases is given, exposing participants to the many freely accessible online data repositories<sup>4-5</sup>. The second module introduces the concepts of remote sensing and provide information on how to retrieve environmental factors using remotely-sensed products, available through the IRI Data Library<sup>5</sup>. The operational use of these products by UN agencies, Ministries of Health in Africa, Asia and Latin America is demonstrated<sup>6</sup>.

The third module introduces the concepts of disease risk related to environmental aspects, presents statistical techniques to explore possible thresholds, time lags and functional forms of the association between environmental factors and disease incidence over time, and explores spatial patterns of disease and environmental risk factors, using the statistical software R. The fourth module focuses on predictive models for vector borne diseases, such as malaria and dengue, based on a spatio-temporal statistical modelling approach and dynamical process-based mathematical disease models<sup>7-9</sup>.

During the training, time is allocated to the development of individual or group participant projects. An opportunity for participants to interact with lecturers and organisers is provided, to understand and consolidate information gained during the lectures and practical sessions.

One of the main objectives is to train young PhD students, climate scientists and public health practitioners from developing countries to work in data scarce environments. Participants are exposed to the many freely

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accessible online data repositories and are invited to bring disease datasets relevant to their own country. They are shown how to use and develop state-of-the-art modelling tools for handling climate and disease data at different temporal and spatial scales. Participants are also provided with climate and environmental datasets that could be used to develop in-country predictive models as part of an early warning system for disease risk.

### The application to policy and practice

A Spring School on Modelling Tools and Capacity Building in Climate and Public Health, sponsored by the International Centre for Theoretical Physics (ICTP) and the World Meteorological Organization (WMO), was held in Trieste, Italy, 15 April – 26 April 2013. The school was attended by 39 participants (a mixture of both students and practitioners) and 11 instructors from around the globe. A diverse range of group projects emerged from



**Figure 1:** Spring School on Modelling Tools and Capacity Building in Climate and Public Health, sponsored by the International Centre for Theoretical Physics (ICTP) and the World Meteorological Organization (WMO), Trieste, Italy, 15 April – 26 April 2013.

**Left:** James Chirombo (participant) and Rachel Lowe (organiser) during a Climate Explorer practical session.

**Right:** End of school group photo.

this training activity, from 'Investigating the relationship between meteorological factors and the severe acute respiratory syndrome (SARS) syndrome in China' to 'A predictive model for dengue cases using climatic factors in Dhaka, Bangladesh'. Several projects are being prepared for publication by participants. Given the success of this school, a follow-up regional activity will be held in Brazil in 2015, in collaboration with the Oswaldo Cruz Foundation. Hosting at locations such as ICTP permits pan-global participation and the efficiencies afforded by the dedicated training facilities and infrastructure on offer. On the other hand, organising activities in-region brings together a wider spectrum of participant expertise and occupations, allowing regional networks and partnerships to be formed that amplify the legacy of such events.

### Did it make a difference?

During the course, participants completed evaluation forms, which helped to monitor the content, delivery and administration of the school. The feedback received is of great importance to ensure the quality of future ICTP climate and public health schools. All participants commented that networking with other climate and public health officials was the 'best part of the course'. Below are example testimonials made by participants in a subsequent follow-up interview. Both participants are actively using the skills learned during the school in their current activities:

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*“The training course on modelling tools for climate and health has been very beneficial to me, both in my professional and academic careers. At the time of the training, I was working with the Malawi ministry of health as a statistician. The course helped me a lot to see the relationships that exist between climate and health and how important it is for governments to mitigate the effects of climate change. It also enabled me to put these linkages into statistical models useful for decision making. During the course, I met a lot of young researchers from different parts of the world and that helped to broaden my horizon. The training provided an opportunity to network and work together through a group project work. I also interacted with senior researchers who were delivering the course materials and learnt a lot from them. To this day, I continue to benefit from their expertise. The way the training was designed encouraged networking which is very crucial in fostering multidisciplinary research. The training also laid a strong foundation for my future academic career. I am currently in the first year of my PhD at the University of Liverpool. The skills that I learnt at the school are proving very useful in my PhD research.” - James Chirombo, Malawi.*

*“The climate and health course held in Trieste, Italy in 2013 provided me with increased knowledge of techniques and technologies, such as the statistical software R, which I am now using in my PhD research to investigate the influence of climate on malaria epidemiology in the Amazon. In the practical part of the course, the instructors were really dedicated both in the preparation of the material and in teaching. The exchange of experiences between students from different countries and areas of knowledge was excellent, both during the execution of the exercises and as the partnerships formed.” - Izabel Cristina dos Reis, Brazil.*

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