

Dengue is the fastest-growing mosquito-borne viral infection in the world today. It is present in over 150 countries, and approximately 40 percent of the world's population now live in countries where dengue is a daily risk.

Dengue risk

- Countries where risk is frequent/continuous
- Countries where risk is sporadic/uncertain

Our Vision: To see D-MOSS become a key factor in reducing dengue fever worldwide.

Dengue costs are greater than other major infectious diseases

- Dengue: 390 million cases per year (estimated)
- Malaria: 214 million cases per year (estimated)
- Zika: 470,000 cases per year (estimated)
- Yellow fever: 200,000 cases per year (estimated)

Costs:

- Dengue: \$8 billion
- Chagas: \$7 billion
- Cholera: \$3 billion
- Rotavirus gastroenteritis: \$2 billion

Overview: The Dengue forecasting MOdel Satellite-based System (D-MOSS) project is developing a dengue fever early warning system. The tool generates several months advance warning of likely dengue outbreaks. One of the key components is a water assessment module that provides the additional benefit of improving water management in transboundary river basins.

D-MOSS will be the first fully integrated dengue fever forecasting system incorporating EO data and seasonal climate forecasts to issue warnings on a routine basis.

D-MOSS became live in Vietnam in June 2019. It is now being made available to an additional six countries in the region.

Vietnam, Cambodia, Laos, Malaysia, Philippines, Sri Lanka, Thailand

The project contributes towards three of the United Nations Sustainable Development Goals (SDGs):

- 3 GOOD HEALTH AND WELL-BEING
- 6 CLEAN WATER AND SANITATION
- 13 CLIMATE ACTION

Visualisation and **Product** components.

Probabilistic forecasts of dengue incidents and **Probabilistic forecasts of water availability**.

Data integration & assessment feeds into the **Dengue fever model** and **VIC hydrological model**.

Historical and live EO data and **Forecasts of meteorological data** feed into the **Dengue fever model**.

Water availability indices feed into the **VIC hydrological model**.

User engagement, **Knowledge sharing**, and **Monitoring & evaluation** are key activities.

Sustainability is a core goal.

D-MOSS Dengue forecasting MOdel Satellite-based System

Forecast number of dengue cases

Forecast number of dengue incidence

Select forecast type:

Color scale: Green (Lowest risk), Yellow (Medium risk), Orange (High risk), Red (Highest risk)

Map showing dengue risk in Vietnam and surrounding regions (Laos, Thailand, Cambodia).

D-MOSS benefits:

- Probabilistic forecasts of dengue outbreaks issued every month, up to seven months in advance.
- Seasonal forecasts of water availability, at a catchment scale.
- Visualisation of forecast number of dengue cases, disease incidence, transmission months, probability of exceeding outbreak thresholds and water availability indicators presented in both English and the local language.
- Supporting information on recommended actions to be taken, provided by the decision makers.

Key technical features

- Incorporation of a variety of Earth observation (EO) data products ranging from historical observations to the latest state-of-the-art missions.
- Hydro-meteorological and societal parameters are analysed in order to infer dengue fever outbreaks.
- A new forecast is issued every month and during outbreaks the forecast can be issued on a weekly basis.
- Web-based visualisation system and numerical model forecasting engine deployed on commercial cloud services which can be accessed via desktop/laptop devices with an internet connection.
- Open-source solutions are employed where possible together with widely known development languages and tools.
- Built in capability to replicate anywhere in the world and for a variety of other diseases.

Project team

UK SPACE AGENCY

The D-MOSS project is funded by the UK Space Agency's International Partnership Programme.

UK: HR Wallingford leading the project, working with the London School of Hygiene and Tropical Medicine, the UK Met Office and Oxford Policy Management.

International: The United Nations Development Programme, the World Health Organization, the Vietnamese Institute of Meteorology, Hydrology and Climate Change, the Pasteur Institute Ho Chi Minh City, and the National Institute of Hygiene and Epidemiology in Vietnam.