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Mapping UNSW Impact
Global Development

Primary SDG	**11: SUSTAINABLE CITIES AND COMMUNITIES**
Broad theme	Anticipating floods in Jakarta
Research	Detecting flood risks in Jakarta based on climate data, and modelling the impact of floods on the city's local districts
Impact region	Indonesia
Faculty	Science
School/Institute	Climate Change Research Centre
Academics	Dr Agus Santoso, Professor Matthew England
Project partners	Bandung Institute of Technology
	UNSW Indonesian Seed Fund - $10,000 in funding, runs out December 2017
Related SDGs	13: Climate Action
	9: Industry, Innovation and Infrastructure

Elevator pitch

UNSW research has detected climate signals for flooding in Jakarta and will model the extent of flooding across the city, helping efforts to protect the city against rising waters, and to minimise damage and disease from flood waters.

The Challenge: How can we better anticipate flooding in Jakarta?

Flooding is a common disaster in Jakarta for its 9.6 million residents. The city sits in a low, flat basin with 40% of it below sea level and 13 rivers passing through, all polluted according to a government agency. Poor infrastructure, deforestation and other socio-economic problems contribute to the flooding.

Large floods in 1996, 2002, 2007 and 2013 caused millions of dollars of damage, mainly from business interruption. Damage in the 2007 flood was US$572 million, with 190,000 people affected by flood-related illnesses. Flood waters in Jakarta are known to spread disease such as dengue fever, malaria, typhus, skin disease and respiratory disease.

Rising sea levels and the fact the city is sinking around 5 to 25 centimetres a year due to subsidence (a rate faster than Venice) are increasing flood risks. The government is considering protecting the city by building a $40 billion dike but according to Agus and his team they are overlooking the impact changes in climate, such as rainfall and sea levels, will have on plans and future flood risk levels.

UNSW's Solution: Look for climate signals in weather data and model flood waters

Indonesia is surrounded by the warmest seas on earth, which change in temperature due to the La Niña, El Niño and Indian Ocean Dipole (the Indian Niña) weather patterns. These weather patterns are predictable. El Nino, for example, can be predicted around six to nine months ahead of its arrival.

UNSW research shows the likelihood of flooding in Jakarta is influenced by these weather patterns. Using data from the Indonesian Agency for Meteorology, Climatology and Geophysics, Agus and his colleagues detected climate signals in sea level and rainfall data that indicated whether more or less flooding in Jakarta would occur.

They will also research the impact rainfall and sea levels have on flood levels at the city's district levels. How deep will flood waters be? How long will they be around for? And how fast will the current be? These are questions their impact and climate models will answer. Each district in Jakarta is unique in terms of its exposure to flooding.

The Impact: Government decisions to better prepare for floods, limiting damage and disease

Jakarta officials are weighing up how best to combat rising waters and minimise flood risk. The work being done by Agus and his colleagues can inform their decision-making process and create better outcomes for the city and its people. Further research at the district level will encourage local councils, business and communities to take steps to better prepare for flooding, minimising damage and disease.

The climate and impact models can be adapted for cities and regions across Indonesia. Each city and area has a different degree of exposure to flooding. Climate data can be fed into the models to provide forecasts that will help cities and regions to better protect themselves and anticipate flooding.

Researcher

Agus Santoso is a physical oceanographer and climate dynamicist. He completed his PhD in 2006 and is a member of the CLIVAR Pacific Panel of the World Climate Research Programme. Born and raised in Semarang, Indonesia, a city affected by flooding, Agus has always wanted to help mitigate floods in his home country.

Professor Matthew England obtained his PhD in 1992 from the University of Sydney. He is a former Fulbright Scholar and was a postdoctoral research fellow at the Centre National de la Recherche Scientifique, France (CNRS), from 1992-1994. He was a research scientist in CSIRO's Climate Change Research Program from 1994-1995 and was a CSIRO Flagship Fellow in 2005. He has been with the University of New South Wales since 1995, where he held an ARC Federation Fellowship from 2006-2010. He commenced an ARC Laureate Fellowship in 2011 and is presently Deputy Director of the UNSW Climate Change Research Centre.

Ben Falkenmire 4.09.17