

## READI Actuarial Science Applied Research Program

### Climate Change and Actuaries in Indonesia – Potential Research Issues

#### Background

The READI Actuarial Science Applied Research program follows the principles of the READI project: (1) cooperation of government, industry and universities; and (2) building public and student understanding of the value and application of actuarial science expertise to address issues such as climate change, gender equality and social equity.

This overview paper outlines potential research issues related to climate change and Indonesia for researchers who are considering applying for grants under the program. The list of issues and examples provided are not comprehensive – applications will be assessed under the program criteria described in application guidelines.

Research issues in this overview are grouped under the following topic areas:

1. Risk Assessment – implications of available climate information for Indonesia on actuarial methodologies and assumptions.
2. Risk Reduction – promoting loss prevention
3. Risk Analysis – Supporting investment in low carbon/low climate impact technologies
4. Risk Transfer – Protecting low-income and vulnerable populations from catastrophic risks
5. Risk Disclosure – Financial industry practices and carbon risk disclosure

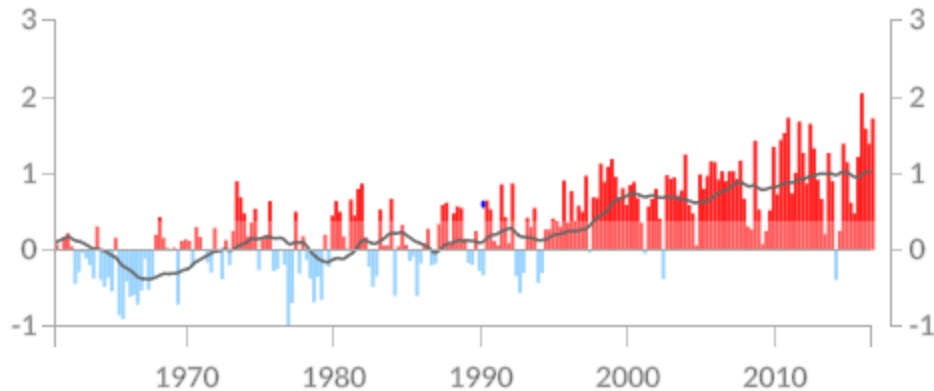
#### Potential Research Issues

##### 1. Supporting understanding of the climate change challenge for Indonesia (risk assessment)

There is an overarching interest in research that can better connect climate information with users in the actuarial profession. This entails: (1) a better understanding of the climate change challenge for Indonesia; and (2) review and revision of actuarial methodologies to incorporate climate information. Potential research issues under this topic include:

- Applying actuarial expertise in data collection, catastrophe modeling and risk analysis to track trends and define problems posed by climate change for Indonesia (e.g., risks associated with floods, sea level change or storm events).
- Building forward-looking risk models (for insurance and related topics – e.g., casualty and property loss) that take climate change into account.
- Development of communication tools specific to Indonesia that utilize actuarial expertise, such as [the Actuaries Climate Index](#) an objective indicator of the frequency of extreme weather and the extent of sea level change developed using North American climate data (chart example below). See: [www.actuariesclimateindex.org](http://www.actuariesclimateindex.org) for an explanation of the climate index components and methods used to develop the index.

## The Actuaries Climate Index



### 2. Promoting loss prevention (risk reduction)

- Managing risks and controlling losses is central to the insurance business, and is evident in the industry's history as founders of fire departments and advocates for building codes. As well as financially managing risks, physical risk management could play a large role in, for example, helping to preserve the insurability of coastal developments and other high risk areas in Indonesia. Land use planning, zoning and building codes are a starting point. Energy management and infrastructure technologies can also reduce vulnerabilities to risk. (For examples, see [Tokio Marine Nichio](#) initiatives in this arena.)
- Aligning insurance terms and conditions with risk reducing behaviour. At the corporate director and officer level, liability for actions (or lacking in actions) regarding climate change risk is an emerging consideration. Examples at the consumer level include premium discounts for drivers of hybrid cars (assessed as "good risks") being given by companies like [Farmers, Sompo Japan and Travelers](#).

### 3. Supporting investment in low carbon/low climate impact technologies (risk analysis)

- Adoption of new or emerging technologies at scale (e.g., renewable energy, LED lighting, energy efficiency measures) involves many uncertainties – reliability of facilities and equipment, risk of failure, production costs, output efficiency, and regulatory and administrative barriers. Risk analysis and options for risk insurance can facilitate investment and build public support for low climate impact alternatives to traditional technologies.

### 4. Protecting low-income and vulnerable populations from catastrophic risks (risk transfer)

- **Microinsurance** – Indonesia (low-income populations in particular) is vulnerable to climate-related catastrophes (flooding, tsunamis, earthquakes and volcanic eruptions). With changing climate, frequency of extreme climate events such as heavy rainfall and high winds can increase. As well as risk reduction, protection and disaster response measures, Microinsurance and other risk transfer measures can provide safeguards in the public interest for vulnerable populations. Indonesia has undertaken a pilot project in [rice crop microinsurance](#) that is being considered for [wider application](#). Further assessment and analysis of opportunities and barriers for application of microinsurance in Indonesia is of value.

- **Catastrophic risk insurance** – “Cat bonds” and catastrophe funds can be used to limit the financial impacts of catastrophic events. The [Caribbean Catastrophic Risk Insurance Facility](#), for example, has provided payouts to governments for hurricanes, earthquakes and excess rainfall since 2007.
- **Climate risk insurance** – a range of analytical methods for consideration of climate risks and risk transfer tools, such as insurance for poor and vulnerable populations, are available. The [Munich Climate Insurance Initiative](#), for example, undertakes related research and projects such as a [November 2016 international review of climate insurance schemes](#). Further consideration of appropriate climate risk insurance tools in the Indonesian context is warranted.

## 5. Financial industry practices and carbon risk disclosure

- The process of assessing and disclosing climate risks contributes to an insurer’s ability to evaluate the impacts of climate change on a business (sector or individual company). Disclosure also supports consumers and investors in making purchase and investment decisions. There is increasing momentum for corporate disclosure of carbon or climate related risks. For example, the Financial Stability Board of the G20 created a [Task Force on Climate-related Risk Disclosure](#) chaired by Michael Bloomberg. The [task force recommendations](#) released in December 2016 have significant implications for corporate reporting and financial markets. Discussion of the Task Force recommendations among leaders in Indonesia’s corporate and regulatory sectors would be of value, with assessment and further recommended actions specific to the Indonesian context.
- There are three broad channels through which climate change can affect financial stability: (1) physical risks (e.g., from extreme weather); (2) liability risks (e.g., litigation, damages); and (3) transition risks (e.g., stranded assets from transition to renewable energy). Financial institutions (including pension plans and asset managers) should be able to describe the risks and opportunities that they face. Clear guidance relevant to the needs of Indonesian institutions would be welcome.
- Applied research in support of risk disclosure could include: (1) analysis of climate information for financial data relevant to Indonesia; (2) inter-disciplinary work with climatologists or other professionals to provide factual and practical information regarding the financial impact of climate risks; (3) developing financial risk management models applicable to Indonesia and adaptable for changing climate conditions; or (4) development of data, tools and methodologies for actuaries to provide high quality risk disclosure services. Specific research would be welcome related to scenario planning and analysis for Indonesia in meeting commitments to limit global temperature rise to two degrees Celsius, as well as other analysis of other scenarios (business as usual or higher temperature rise). Also needed is analysis and guidance regarding application of discount rates to provide credible financial comparisons over a long time horizon.