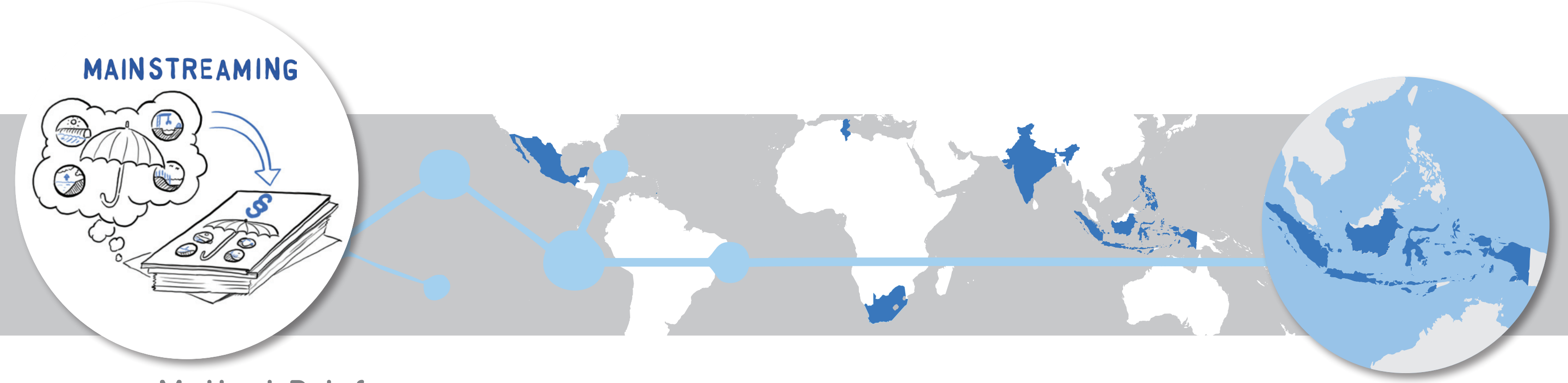

Method Brief

Indonesia: Risk and Adaptation Assessment

The Approach

Climate Change Risk and Adaptation Assessment (CRAA), also known as KRAPI (Kajian Risiko dan Adaptasi Perubahan Iklim), is an approach that includes a multi-hazard and multi-sector climate risk assessment in its first part. In its second part, it provides the basis for developing and selecting appropriate adaption measures, and a process to mainstream these adaptation measures into existing development policies. The approach was piloted in selected Indonesian provinces, districts and cities (Lombok Island, Tarakan City, South Sumatra and Greater Malang).

Scope and entry points

KRAPI becomes relevant within planning processes at provincial and district level, where it supports decision-makers to better reflect future climate-related risks. It was launched as part of the development processes.

How it works

The approach comprises a process of identifying and projecting climate risks as well as reflecting them during development of adaptation measures. The process steps are illustrated in Figure 1. The approach starts with **problem identification**, mainly based on consultations (i) with the general public to collect stakeholder feedback, (ii) with local government offices and relevant government agencies such as the National and Local Disaster Mitigation Boards (BNPB and BPBD), Environmental Protection Offices (BPLHD and Bappedalda), and (iii) with experts from predetermined climate-dependent sectors. Findings from these consultations provide the basis for detailed hazard analysis and vulnerability assessment.

Climate trends are being analysed by applying and downscaling Global Climate Model (GCM) data and by then validating these data. The outputs of the climate analysis are used for **current (baseline) and projected hazard analysis**, based on several impact models and statistical methods for empirical impact analysis such as: HECRAS for flood analysis, GEOSLOPE for landslide analysis, water balance and water budget for water shortage, regression and correlation for vector-borne disease incidents.

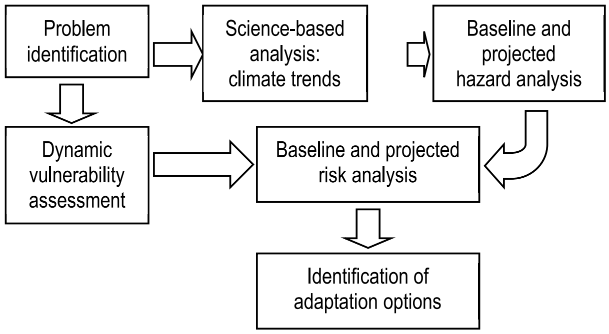

Figure: KRAPI identification of adaptation options through a climate risk assessment (i.e. KRAPI part 1).

Both baseline and projected impacts are being used to assess the **baseline and projected future risks** resulting from climate change. The projection of risks also requires a systematic **assessment of vulnerabilities** including the components of exposure, sensitivity and adaptive capacity in accordance with the IPCC definition. Indicators of each vulnerability component are determined by experts. This assessment also has to reflect that vulnerability components and their indicators will change over time (dynamic assessment).

Climate risk is a function of climate hazard and vulnerability. These two factors are integrated and operationalized by overlaying hazard and vulnerability maps using a spatial information system, and then classifying the results based on a 'Risk Chart'. Comparing future risks with baseline risks can identify contributions from climate change.

Identification of adaptation options is based on results of the climate risk assessment under consideration of specific features of the target area. The selection of appropriate adaptation options is supported by checklists.

On behalf of

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Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

of the Federal Republic of Germany

Specifics of application

Stakeholders and institutional set-up

The main stakeholders of this approach are provincial and district/city governments whose sector planning might be affected by climate change. The Ministry of Environment plays a coordinating role, while other institutions that support the application include the National and Local Disaster Mitigation Boards as well as Local Environmental Protection Boards or offices.

Input

The approach requires 3–6 sectoral disaster experts (depending on number of sectors studied), and a climatologist or meteorologist. The approach depends on a set of climate data for climate analysis, a set of socio-economic data for vulnerability assessment, and standard topography maps (*peta rupa bumi*) for risk analysis and area typology assessment. Observed climate data are available at local meteorological offices or the National Agency for Meteorology, Climatology and Geophysics (BMKG). GCM data can be drawn from the IPCC Data Distribution Centre. The socio-economic data are available at government offices like the Bureau of Statistics. The first part of the KRAPI approach may require 6–12 months for completion, depending mainly on data availability, while the second part of the KRAPI approach requires 8–11 months.

Output

The main outputs are risk maps that serve as support tools for decision-makers (first part) as well as a list of adaptation options agreed upon by involved stakeholders and mainstreamed into the development policies.

Capacity required and ease of use

The approach requires a large amount of data that may not always be available or accessible. Accordingly, it is necessary to have support from the institutions that possess the data. Specific expertise is required for climate trend and hazard analyses. Universities and institutions may not have experts with sufficient levels of capacity.

Conclusions for future application

Outcome and added value

Due to the pilot character of this project, there is no evidence yet about how the approach has affected decision-making relevant to adaptation in the pilot areas.

Cost-benefit ratio

Final calculation of the cost-benefit ratio depends on the identification of outcomes. However, even now it can be indicated that the costs are relatively high.

Potential for replication

Due to its resource intensiveness, the approach is especially applicable to other provinces and districts/cities if support is being provided, for example by national institutions. Application might be restricted to selected areas, which are especially at risk from climate change.

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