Climate hazard-based impact assessments in the context of a risk framework

FACTSHEET

This factsheet provides essential information on integrated climate risk concepts and terminology specifically related to hazard-based impact assessments for sectors in Vanuatu.

Climate risk concepts

Risk is the potential for adverse consequences, including for lives, livelihoods, health and wellbeing, socio-economic and cultural assets and investments, infrastructure, services, ecosystems, and species [1].

In the historical and future climate context, risk results from interactions between the physical climate hazard, exposure and vulnerability of the affected system(s), noting that each element is dynamic, i.e. changing over time [2]. Risk is affected by the adaptive response(s) designed to avoid, mitigate or otherwise manage the risk (Figure 1) [3]. Interdependencies across sectors (be that social, environmental or economic) can lead to aggregate, cascading or compounding risks with increased complexity and consequences [3]. For example, a drought combined with a heatwave can cause heat-related stress and deaths, power outages affecting critical infrastructure and essential services, water shortages affecting food production, loss of ecosystem services, and stress for individual households and communities, businesses and by association the national economy.

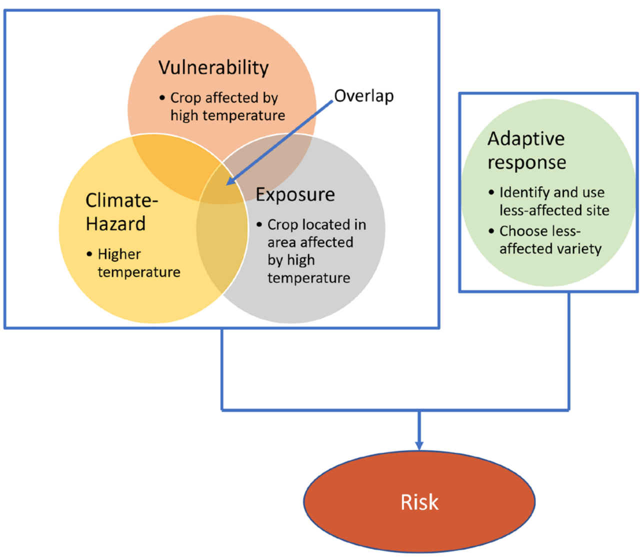

Figure 1 Components of risk are hazard, exposure and vulnerability [2]. The overlap in the diagram may change in any given situation, i.e. bigger/smaller hazard, less/more exposure, less/more vulnerability [2]. Adaptive response can reduce risk or, if not suited to the situation, can increase risk [3]. Examples of the components are given as dot points [4].

In this context, the **climate hazard** is the potential occurrence of a physical event, process or trend that may affect the system of interest. Hazards can be assessed for the historical and/or future climate, including the effects of climate variability and extreme events. Climate hazards can include average and extreme temperature and rainfall, heat waves, tropical cyclones, floods, droughts, marine heat waves, sea level rise, and ocean acidification [1]. The assessment of such hazards to inform risk is typically in the form of hazard-based impacts, i.e., what is the known and/or expected physical impact of the hazard(s) on the system of interest?

Exposure refers to the presence of people, livelihoods, species or ecosystems, environmental services and resources, infrastructure, and economic, social, or cultural assets in places and settings that could be adversely impacted by these hazards [1].

Vulnerability is the propensity or predisposition of the impacted/exposed system in question to be adversely affected. It can be interpreted as the degree to which an impacted/exposed system is susceptible to, or otherwise unable to cope with, the adverse effects of a climate hazard. This may be related to physical factors, such as infrastructure or building design, or socio-economic factors, such as poverty and inequalities in health, education, and information access [1].

Adaptive responses can help to address risk by reducing vulnerability and/or exposure through building adaptive capacity and enhancing the overall resilience of systems. This typically requires coordinated action at all levels of society including the government, private sector, and local community. Where possible, adaptive responses are facilitated by climate risk informed policy and management planning, together with strengthening institutional capacity for enhanced decision-making and implementation, including for both adaptation and climate-related disaster preparedness. Responses may vary for different sectors such as infrastructure, water, agriculture, fisheries, tourism, energy, telecommunications, health, and education (to name a few). An example for the infrastructure sector might include specific initiatives such as improved building standards and planning guidelines.

Ultimately, the only way to eliminate or at least reduce hazards related to climate change is to reduce greenhouse gas concentrations in the atmosphere [5].

Enabling conditions for adaptation include political will and leadership, institutional frameworks, clear goals and priorities, enhanced knowledge on impacts and solutions, access to finance, monitoring progress and evaluation of outcomes [5]. Key barriers to adaptation are limited financial and technological resources, lack of private sector and citizen engagement, insufficient mobilisation of finance, low climate literacy, lack of political commitment, limited adaptation research and low sense of urgency [5]. With additional global warming, there will be limits to adaptation and more associated losses and damages [5].

Maladaptive risks emerge from actions not achieving their intended objectives through issues such as poor implementation (including not properly understanding the local context), uncertain technology adoption, or ineffective system transitions [1]. In particular, the lack of a scientific evidence basis to inform the response and associated decision-making (for example the application of climate information services), has the potential to limit the effectiveness and efficiency of adaptation and disaster preparedness, and thereby to seriously constrain societal resilience in the face of climate change for Pacific Island countries.

A **risk assessment framework** is a systematic and strategically framed process to outline, assess, prioritise, and communicate risk-related information for systems of interest. Most climate risk assessment frameworks follow the International Standard for Risk Management (ISO 31000). The process starts with understanding the context, then identifying and analysing the risks, evaluating and prioritising risks, planning and implementing risk management strategies, then monitoring and evaluating effectiveness [6]. For Van-KIRAP, we have adapted the ISO 31000 framework to create a simple, step-by-step approach to undertaking climate hazard-based impact assessments to inform risk (Figure 2).

STEPS FOR CONDUCTING CLIMATE HAZARD-BASED IMPACT ASSESSMENTS

STEP 1 Understand the context and scope

STEP 2 Organise meeting of potential stakeholders to discuss project

STEP 3 Explore relevant background information and historic climate data

STEP 4 Collect information about future climate scenarios

STEP 5 Analyse climate-related impacts under ‘best-case’ and ‘worst-case’ scenarios

STEP 6 Evaluate all other climate and relevant non-climate factors

STEP 7 Plan future adaptation measures and treatments

STEP 8 Communicate findings

Figure 2 Steps for conducting climate hazard-based impact assessments.

Climate hazard-based impact assessments for Van-KIRAP

Sector-specific climate impact case studies (called infobytes) have been produced for the Van-KIRAP project to illustrate the application of historical and future climate data for hazard-based impact assessments in Vanuatu. These infobytes are referred to as ‘Climate hazard-based impact assessments’, as distinct from full ‘Climate risk assessments’.

‘Climate hazard-based impact assessments’ and ‘Climate risk assessments’ have differences:

A **climate hazard-based impact assessment** (e.g., Van-KIRAP infobytes) is focused on links between physical hazards and impacts, without explicit consideration of exposure and vulnerability.

A **climate risk assessment** considers interactions between hazard, exposure, and vulnerability, as well as the effectiveness of adaptation responses and associated risk mitigation measures.

A standardised methodology for undertaking climate hazard-based impact assessments for sectors in Vanuatu has been developed as a climate information service (CIS) by the Van-KIRAP project (Figure 2) (see Guidance factsheet), together with development and implementation of selected case studies to demonstrate practical application of the methodology and associated CIS products for priority sectors (agriculture, fisheries, water, infrastructure and tourism).

References

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