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Cost Recovery Mechanism and Models Appropriate for the Vanuatu Meteorology and Geo-hazards Department



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Cost Recovery Mechanism and Models Appropriate for the Vanuatu Meteorology and Geo-hazards Department

Prepared for: SPREP project *Development of a Data Management and Governance Policy for the Vanuatu Meteorological and Geo-Hazards Department*

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Acronyms

DRR	Disaster risk reduction
ICT	Information and communication technology
VMGD	Vanuatu Meteorology and Geo-hazards Department
Mb	Megabyte
Gb	Gigabyte

1.0. Introduction

The Vanuatu Meteorology and Geo-hazards Department (VMGD) is a government department within the Ministry of Climate Change, Meteorology, Geo-hazards, Energy, Environment and Disaster Management. The department was established under the Vanuatu Meteorological Service Act of 1989. The Meteorology, Geological Hazards and Climate Change Act of 2016 superseded this Act replaced. The new Act gives direction to the operations of VMGD. Specifically, it directs the department to collect, collate and make available meteorological, climate, climate change, and geo-hazard data and information, including archiving such data or information, amongst other duties (Republic of Vanuatu, 2017). Furthermore, the Act allows the department to achieve its mandate of installing and maintaining a national network of meteorological observation stations and all other necessary technical installations and equipment (Republic of Vanuatu, 2017).

Effectively, the Climate Change Act of 2016 gives responsibility to VMGD to collect and manage hydrometeorological and geoscience data and undertake seasonal forecasting, technical analyses, and climate change predictions for Vanuatu. To carry out its mandate effectively, VMGD established seven (7) Divisions being:

- **Administration Division** provides leadership and management structures for the operation of the VMGD.
- **Observations Division** maintains observational networks for collecting weather and climate information weather.
- **Weather Forecasting and Services Division** generates data and information on weather and forecasts and provides warnings for air and maritime navigation on tropical cyclones, storm surges, and high tides. This is achieved using state-of-the-art weather forecasting systems.
- **Climate Division** offers the country climate services, long-term forecasts, and warnings. Some of the envisaged critical outcomes of this division include improved management of historical meteorology, hydrological and other related environmental data, and assurance

that the databases for information are maintained and operationalised (VMGD, 2014).

- **Climate Change and Disaster Risk Reduction Division** leads and guides the development and implementation of climate change (adaptation and mitigation) and disaster risk reduction programmes and projects to support the national-level commitments to climate change and disaster risk management in multilateral agreements.
- **Geo-Hazards Division** offers services and products on Geo-hazards risks. The division uses modern science and technology to monitor and map geological hazards such as earthquakes, tsunamis, and volcanic eruptions for the early warning system, amongst others. The division has operationalised a geohazards database for the country.
- **Information and Communications Technology (ICT) and Engineering Division** is the heart of the VMGD database system. It monitors the networks and the automated sensors and ensures that all observation data is automatically captured from all divisions. Furthermore, it ensures that the database for the divisions is operational and that the online request systems for VMGD divisional data are functioning. The division thus supports the other divisions in ensuring that the ICT equipment is functional to support data processing and storage. This division has an engineering section that deals with instrumentation and data collection.

In line with the Ministry of Finance and Economic Development, VMGD has embarked on a cost recovery exercise. The Meteorology, Geological Hazards and Climate Change Act No. 25 of 2016 gives the Ministry of Climate Change, Adaptation, Geo-Hazards, Meteorology and Energy the power to charge meteorological fees. Due to the extensive services produced by VMGD, the charges are diverse. However, consultations with stakeholders suggest that the fees are fixed and not based on the quantity of data as measured by megabytes (Mb), Gigabytes (Gb), etc. Furthermore, the fees do not consider the cost of data. Against this background, the assignment is updated to recommend an appropriate data cost recovery mechanism and factors to assess when formulating the appropriate fees.

2.0. Objective of the assignment

This report is one of the deliverables for the assignment titled *Development of a Data Management and Governance Policy for the Vanuatu Meteorology and Geo-hazards Department*. The report aims to review the current weather, climate, and geoscience data cost recovery structure and develop options and recommendations for VMGD consideration.

3.0. Methods and approaches

Two main methods were employed to review and develop options and recommendations on a data cost recovery structure for VMGD: a desk review and consultation with the VMGD division management and the stakeholders.

As part of the desk review, various documents were collated and thoroughly reviewed to identify existing cost recovery models and structures and factors to consider when setting cost recovery fees, such as long-term and short-term marginal costs of operation and the nature of data use (commercial, non-commercial, research, etc.). Some of the documents that were analysed include:

- Department of Treasury and Finance (2013)
- The Treasury (2017)
- Productivity Commission (2001)
- Ministry for Primary Industries (2018)

The stakeholder consultation yielded a situational analysis to identify the current cost recovery measures in place. The consultation involved assessing the current fees, their affordability, and whether all potential customers were included in the cost recovery scheme. The division managers and stakeholders were consulted on the cost recovery measures and possible areas of improvement.

4.0. Current cost recovery mechanism in VMGD hydrometeorological and Geo-hazards data

In line with the Meteorology, Geological Hazards and Climate Change Act No. 25 of 2016, VMGD has developed and implemented a cost recovery scheme. A cost recovery scheme is a measure to recover some or all the institution or entity costs of an activity. In the case of the VMGD, the department incurs costs in generating and disseminating hydrometeorological and geo-hazards data and information. The VMGD cost recovery scheme charges fees for the climate services (data and weather forecast) instead of cost recovery taxation.

The charges cover international and domestic meteorological fees and fees for products and services (Annex 1).

An assessment of the current cost recovery fees reveals the following:

- Firstly, the international and domestic meteorological fees are not based on the operational costs or the marginal costs of data production but instead are based on the weight of the aircraft and the fuel usage, respectively.
- Secondly, the fees for the products and services seem fixed and disregard the quantity of the data supplied. For instance, the fees should be based on the megabyte (Mb) or gigabyte (Gb).
- Other services should be included in the cost recovery, particularly the maritime, which requires similar climate services to aviation.
- The objective of the cost recovery scheme is not clearly defined.
- Lastly, no clarity exists on how the fees were formulated and which parameters were considered in developing the charges.

Based on these identified deficiencies, the existing cost recovery models and principles are assessed to make the appropriate recommendations to VMGD.

5.0. Existing cost recovery mechanism and models

There is a substantial amount of literature on data cost recovery mechanisms and models, covering guidelines on cost recovery

mechanisms, aspects to consider when setting up cost recovery schemes, and the issue of data as a private vs public good. The aspects that are taken into consideration when setting up the scheme and the fees are discussed below.

5.1. Factors to consider when determining a cost recovery scheme

According to the Department of the Treasury and Finance (2013), some essential aspects should be considered when setting cost recovery charges. The first critical element is to ensure that the fees are set based on an 'efficient' cost base. The efficient cost principle is based on the notion that charges should be set at a level that recovers the 'efficient' (i.e. minimum) costs of providing the good/service at the required quality.

The other aspect to consider is that the cost recovery fees should not be used to fund the unrelated activities of the entity. This is known as cross-subsidies, and it should be avoided as it could create a disincentive for the use of the service provided by the entity for the department (The Treasury, 2017).

Another factor to consider when setting up the fees is to avoid fee volatility. Fees volatility creates uncertainty and could disincentivise the stakeholders from buying data for their consumption.

Assessing the nature of the data and information provided is also vital. Climate data is often a public good in that it is non-rivalrous and non-excludable. It is non-rivalrous because one's consumption does not diminish another user's utility from consuming the same data. It is also non-exclusive since it is difficult to exclude others once the information is in the public domain. Based on the notion of climate data and information being a public good, it is also fundamental to consider that providing climate data and information to the public has significant positive spillover effects.

For instance, weather forecasting guarantees that people take disaster risk reduction (DRR) measures and avert extensive losses in the form of human lives and economic assets.

Thus, it is essential that, when setting up cost recovery fees and mechanisms, cost-benefit analyses (CBA) are undertaken to guide the establishment of schemes that will ensure that cost recovery maximises the benefits and minimises the costs.

It is important to note that climate data, in particular, can be a private good, mainly when consultants use it for commercial purposes where the benefits are private and excludable.

5.2. Type of costs recovery fees.

There are three ways in which a cost recovery mechanism can be implemented. These are a fee, a levy, or through specific taxation (The Treasury, 2017). A fee is like a price: a payment for a defined product or service. A levy is a charge to a particular party or group for a specified purpose, but not necessarily for a specific good or service (The Treasury, 2017). The appropriate form of cost recovery for VMGD is a fee, given the diversity of its products and the fact that the stakeholders/customers can demand different quantities.

There are different ways in which the cost recovery fees can be set; partial cost recovery or full cost recovery. A total cost recovery aims at ensuring that all the relevant costs of providing a service (climate service) to the stakeholders are included in the prevailing cost recovery fee (Department of Treasury and Finance, 2017). Total recovery fees aim to either break even or profit from the service being provided. This pricing model could lead to a situation where the cost of data to the stakeholders becomes unaffordable to the extent that the cost recovery scheme undermines the objective of the Meteorology, Geological Hazards and Climate Change Act of 2016. Furthermore, it can also violate the Right to Information Act.

Partial cost recovery is when the fee is set at a rate lower than the total cost of the service/product provided. The aim is not to break even or profit from the service provided. According to the Department of Treasury and Finance (2017: 27), the “decision to charge at less than full cost recovery would need the shortfall to be made up from general taxation”.

The last form of setting fees is based on the marginal cost of production. Marginal cost is the additional cost of producing one more service unit (the

cost incurred in producing 1 Mb/Gb of hydrometeorological and geo-hazards data). The approach excludes other costs, such as fixed or capital costs. According to The Treasury (2017), charging at the marginal cost can promote efficiency over the short term. Production methods' marginal cost may be used when a product or service is provided predominantly for a core user/s (Treasury and Finance, 2017).

Another form of pricing is differential pricing, where the fees are different depending on the types of clients for the same output (e.g., 1 Mb or data will be charged differently between commercial users, local researchers, international researchers etc). Similarly to the fees (partial, full recovery and marginal costs), it is critical to be mindful of the incentives and disincentives that might arise due to the fee structure (e.g. the extent it encourages or discourages access to the service).

Differential pricing and marginal costs can be used to set the cost recovery fees. In this instance, the commercial stakeholders are charged at marginal costs, while the non-commercial can be charged below the marginal costs.

Lastly, there is cross-subsidisation pricing. This is where the different outputs are charged differently. For instance, processed data could be set higher than raw data to include value addition to the processed data.

5.3. The cost recovery scheme design for VMGD

VMGD provides vital climate service to the public and the international community. The services support all economic sectors (aviation, tourism, agriculture, land use, water, infrastructure, etc) and community livelihoods. Therefore, it is fundamental that a cost recovery scheme considers that the fees do not create a disincentive for using the data and information generated by VMGD. One of the most important criteria that must be considered is ensuring that all the stakeholders can afford the set cost recovery fees. Consequently, a partial cost recovery scheme is proposed for VMGD. The partial cost recovery scheme could be set at a short-term marginal cost. Short-term marginal costs disregard the capital costs, which would make the cost recovery scheme unaffordable to the stakeholders if they were to be included.

In addition to charging at the short-term marginal costs, price differentiation should be applied to ensure stakeholders' affordability further. A combination of price differentiation and short-term marginal cost pricing will ensure that stakeholders' affordability is guaranteed. It is proposed that the stakeholders should be categorised into local vs international and commercial vs non-commercial. Based on the short-term marginal cost and price differentiation, Figure 1 below depicts the proposed cost recovery fees for VMGD.

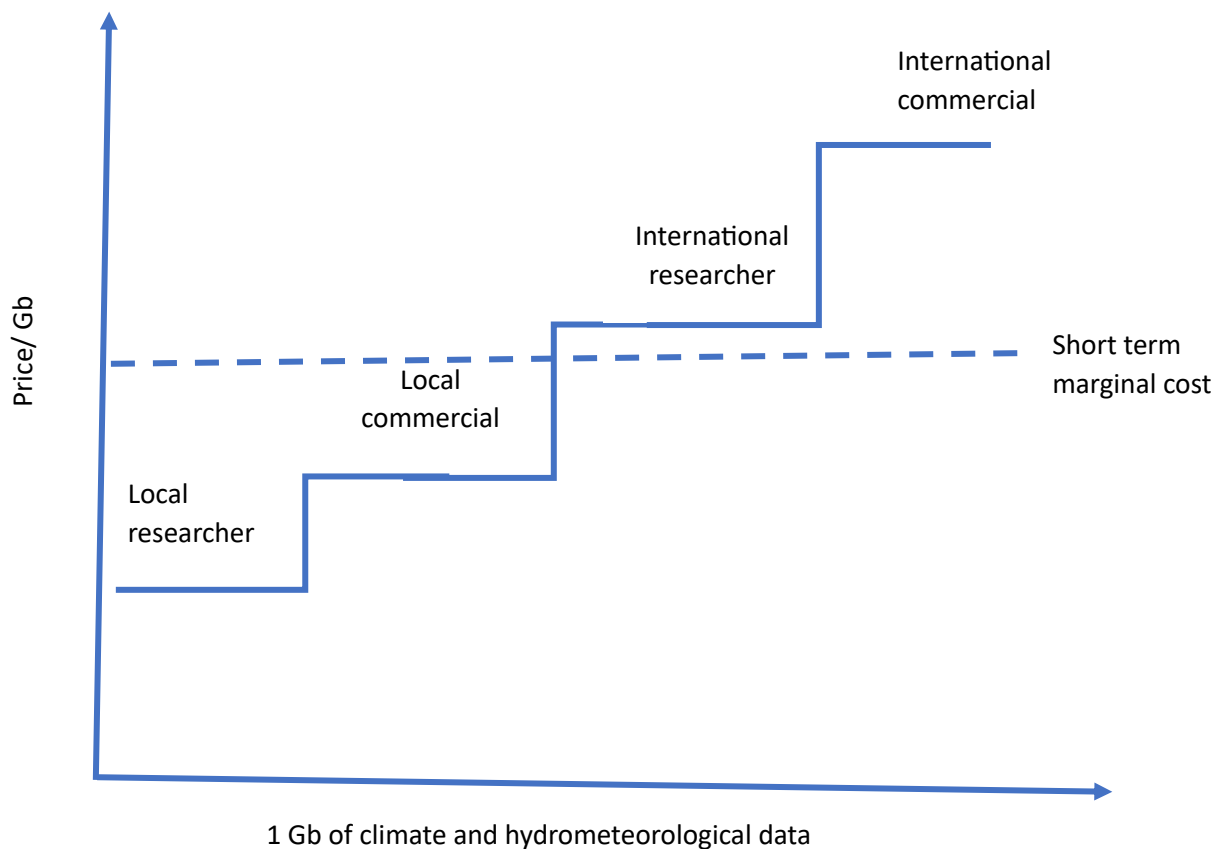


Figure 1: Price differential on based on marginal cost

Under the proposed pricing scheme, local researchers and local commercial enterprises will be charged fees lower than short-term marginal costs. In contrast, international researchers and international commercial enterprises will be charged fees higher than short-term marginal costs. However, it is essential that, before adopting the proposed scheme, the marginal cost of data generation is estimated, and the impact of setting the fee at a short-term marginal cost is determined. Furthermore,

more analysis must be undertaken to determine whether setting the prices at short-term marginal costs will be affordable to the stakeholders.

6.0. Conclusion

VMGD's main task entails collecting and managing hydrometeorological and geoscience data and undertaking seasonal forecasting, technical analyses, and climate change predictions for Vanuatu. In line with its parent Ministry, the Ministry of Finance and Economic Development, VMGD has initiated a cost recovery scheme. The Meteorology, Geological Hazards and Climate Change Act No. 25 of 2016 gives the Ministry of Climate Change, Adaptation, Geo-Hazards, Meteorology, and Energy the power to charge meteorological fees.

Based on an assessment of the current cost recovery scheme, the following conclusions are drawn:

- There is no clear-cut methodology on how the current fees were formulated.
- Some of the fees, such as international and domestic, are based on the aircraft size and fuel usage, which does not reflect the data generation cost.
- The objective of the cost recovery scheme is not stated; the aim would generally guide how the fees should be formulated.
- An impact assessment of the fees was not undertaken; this would determine how the fees will achieve the objectives of the cost recovery scheme, their impact on data usability, and the disincentives likely to be created by them.

7.0. Recommendations

Based on the above conclusions, the following recommendations are made:

- Determine the objective of the cost recovery scheme, whether to recover total costs or partial costs.
- Undertake a detailed study to estimate the long-term and short-term marginal costs of data production for VMGD.

- Undertake a complete study on the impact of setting cost recovery fees at different criteria, such as marginal cost of production. The study should focus on affordability, the disincentives that the prices would create, and the implication on data usability.
- Consult with the stakeholders on proposed fees and develop an engagement strategy.
- Based on the results from the above study, set the fees at differential pricing to ensure affordability.
- For stakeholders who are given permits and require weather forecast services, including the data fees on the permits to avoid fee collection challenges.

8.0. References

Department of Treasury and Finance (2013) Cost Recovery Guidelines- Incorporating the information formerly published in the Guidelines for Setting Fees and User-Charges Imposed by Departments and Central Government Agencies. www.dtf.vic.gov.au

The Treasury (2017) Guidelines for Setting Charges in the Public Sector

Borenstein, S (2016) The economics of fixed cost recovery by utilities. The Electricity Journal. Vol 29, No 7 Pages 5-12. September 2016.

Productivity Commission 2001, Cost recovery by Government agencies, Report no. 15, AusInfo, Canberra.

Annex 1: current VMGD fees

International Meteorological fees

weight	aircraft receiving basic aviation support services	aircraft receiving enhanced aviation support services
more than 40 tonnes	VT10,000	VT12,000
less than 40 tonnes	VT4,000	VT6,000

Domestic meteorological fees

type of fuel	fee per litre
aviation turbine fuel (AVTUR)	VT0.4
aviation Gasoline (AVGAS)	VT0.7

Fees of products and services

products and services	Fees (VT)	Particular	Format	Comment
insurance reports	VT200,000	Specific meteorological and geo hazards information required	PDF (email) A4 (Printout)	When requested
extended forecast (3-7 days) Land	VT12,000(6 months subscription)	Weather, Maximum & Minimum Temperature	PDF (email) A4 (Printout)	Seven days Forecasts (Free on VMGD website, radio, or call direct to the office)
Extended forecast (3-7 days) Marine	VT12,000(6 months subscription) (Printout per copy)	Wind speed & direction, sea state, swell height & direction	PDF (email) A4 (Printout)	Four-day Forecast (Free on VMGD website, radio, or call direct to the office)
tropical cyclone	VT15,000 (per cyclone	cyclone location, central pressure,	PDF (email) A4 (Printout)	(Free on VMGD website, radio, or

bulletins and forecast track maps (48 hours)	season subscription) VT100 (Printout per warning)	wind speed/direction, direction of TC movement, forecast position, associated weather		call direct to the office)
severe weather	CT12,000 (6 months subscription) VT100 (Printout per copy)	Inland wind of 40 to 50 km/hr. or more & rainfall of 100 millimetres or more + risk of flash flooding + flooding of rivers	PDF (email) A4 (Printout)	(Free on VMGD website, radio, or call direct to the office)
Vanuatu Tropical Cyclone Tracking Map	VT100 (printout per copy)	Vanuatu Area (to plot cyclone position during TC event)	A4 (Printout)	Free on VMGD website, TV Telephone directory
Tide prediction	VT300 (per page)	Time, High & low tides, Moon phases	A4 (Printout)	Accessible on VMGD website, radio, Daily Post & Independent Newspaper
Climate Change Report	VT20,000 (per copy)	Vanuatu climate information included in the report	Book	Available at Vanuatu Meteorology & Geo-Hazards Office
data required for Projects	VT100,000	Rainfall Data, Wind Data, temperature data (daily, Monthly, Yearly Average)	Excel format Email	The fee is to be included in the project proposal
data required for Projects	VT20,000	Earthquake data (Monthly, Yearly within a specific magnitude range)	Excel format	The fee is to be included in the project proposal
data required for Research	x	volcano-seismic data	Digital format for specific periods	The fee is to be included in the project proposal

data required for Research	VT20,000	Rainfall Data, Wind Data, temperature data (daily, Monthly, Yearly Average)	Excel format	The fee is to be included in the project proposal
Earthquake information	VT24,000 (12 months subscription) VT100 (Printout per copy)	Earthquake magnitude >M5, depth and location	PDF (email) A4 (Printout)	Free on VMGD website, radio, or call direct to the office
Volcano hazard and risk maps	VT1,000 (Printout per copy)	Zoning of vulnerable areas to volcanic ashfall, volcanic gas, mudflows, lava flows, hot ash flows	PDF (email) A4 B/W (Printout) A4 colour (Printout) A3 colour (Printout)	Free on website
Earthquake hazards and risk maps	VT,1000 (Printout per copy)	Liquefaction susceptibility, peak ground acceleration, expected shaking intensity, inferred site class	PDF (email) A4 B/W (Printout) A4 colour (Printout) A3 colour (Printout)	Free on website
Earthquake information	VT12,000 (6 months subscription) VT 100 (Printout per copy)	Earthquake magnitude >M5, depth and location	PDF (email) A4 (Printout)	Free on VMGD website, radio, or call direct to the office
River flooding hazards and risk maps	VT1,000 (Printout per copy)	Flood depth, flood velocity	PDF (email) A4 B/W (Printout) A4 colour (Printout) A3 colour (Printout)	Free on website
landslides hazards and hazard maps	VT1,000 (Printout per copy)	Inferred landslide susceptibility	PDF (email) A4 B/W (Printout) A4 colour (Printout) A3 colour (Printout)	Free on website

wind hazard and risk maps	VT1,000 (Printout per copy)	sustained wind speed	PDF (email) A4 B/W (Printout) A4 colour (Printout) A3 colour (Printout)	Free on website
coastal inundation hazard and risks maps	VT1,000 (Printout per copy)	coastal inundation exposure	PDF (email) A4 B/W (Printout) A4 colour (Printout) A3 color (Printout)	Free on website
Tsunami hazard and risk map	VT1,000 (Printout per copy)	inferred landslides susceptibility	PDF (email) A4 B/W (Printout) A4 colour (Printout) A3 colour (Printout)	Free on website
combines maximum risk maps for planners	VT1,500 (Printout per copy)	Inferred landslide susceptibility	PDF (email) A4 B/W (Printout) A4 colour (Printout) A3 colour (Printout)	Free on website