COUNTRY HYDROMET DIAGNOSTICS

Informing policy and investment decisions for high-quality weather forecasts, early warning systems, and climate information in developing countries.

December 2023

Timor-Leste National Directorate of Meteorology and Geophysics (DNMG) Peer Review Report

Reviewing Agency: Finnish Meteorological Institute (FMI) and Meteorology, Climatology, and Geophysical Agency of Indonesia (BMKG)

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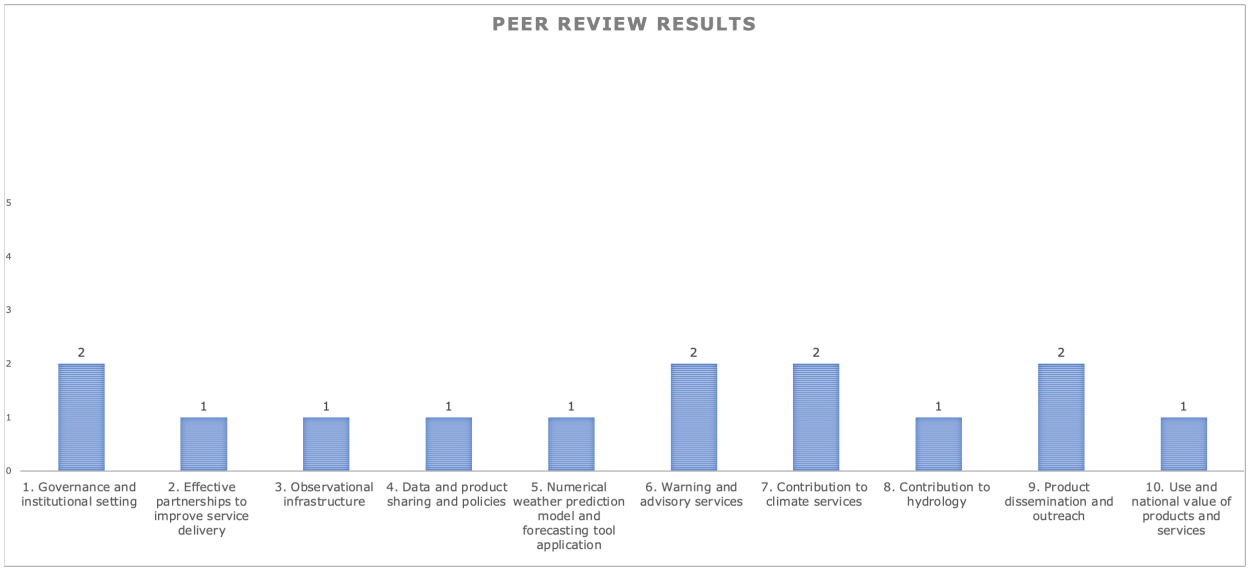
Executive Summary

The National Directorate of Meteorology and Geophysics of Timor-Leste (DNMG) scores are between 1 and 2, and the institute requires middle and long-term planning to finance and develop its activities and services. Overall, Timor-Leste has a national policy that facilitates higher education; it enables that most of the experts at DNMG have university degrees in a related field of competence. Nevertheless, the DNMG and the National Directorate for Water and Sanitation need to increase the number of personnel in technical areas, especially to maintain their stations and ICT capacities. In addition, the managerial personnel from both institutes need specific training on strategic planning and mid- long-term financial planning. There is a need for long-term strategic planning for both institutions. Timor-Leste must develop a regulatory law for their different areas of responsibility (Air quality, Hydrology, Agrometeorology, Climatology). Adequate budgetary assignation for the DNMG is needed to guarantee the proper operation of the institute and to secure the appropriate network maintenance. The expansion and maintenance of the network must be included in the country's development plan. Stable work conditions and fair salaries for the institute's employees need to be secure to avoid the country's brain drain.

It is also important to promote internal cooperation between the different institutes and proper data-sharing policies to facilitate the work of the different institutes and the institute's operations. The warnings and advisory services need better coordination to secure a fast and effective reaction for the Timor-Leste society, especially for the most vulnerable population. Coordination with the different NGOs and international cooperation support to the country's activities is needed to ensure that there is no overlap in the support and that the donations follow the country's development.

The forecasters need specific training for critical areas for the weather forecast, like aviation and maritime forecasts and alerts production. On top of the training needs, the tools used for the forecasters are not adequate for forecast production; proper software tools and workstations need to be set up in the forecast office to facilitate the data integration and visualization of the information and to make the forecast production and dissemination. DNMG forecasters need training on modelling and satellite interpretation and modelling operation to develop their forecasts further. Training in nowcasting and radar data interpretation is also required, especially now that the DNMG will have three radars as part of its network. DNMG forecasters need to learn about radio-sounding data interpretation and use.

DNMG needs to increase the capacity for the operation and maintenance of its observational network; the data transmission from the stations to the database needs to be implemented, as well as the QA and QC of the data. DNMG needs support for the maintenance and calibration of the stations. International cooperation needs to be promoted, especially with the neighbouring countries. It is expected that BMKG will support DNMG for the calibration of the stations. Despite increasing the network operations staff, training the experts on specific tasks is also important. It is especially important now that DNMG will get a new radio-sounding system and 3 radars to support the network.



Element	Maturity level score
1. Governance and institutional setting	2
2. Effective partnerships to improve service delivery	1
3. Observational infrastructure	1
4. Data and product sharing and policies	1
5. Numerical weather prediction model and forecasting tool application	1
6. Warning and advisory services	2
7. Contribution to climate services	2
8. Contribution to hydrology	1
9. Product dissemination and outreach	2
10. Use and national value of products and services	1

Chapter 1: General information

Introduction

Timor-Leste is located between Southeast Asia and the South Pacific; the island of Timor is the largest of the Lesser Sunda Islands, which lie within the Malay Archipelago. The island is surrounded by the Ombai and Wetar Straits of the rougher Banda Sea in the north and the calmer Timor Sea in the south. Timor-Leste shares the island with Indonesia. The Indonesian territory is separated in the Oecusse exclave from the rest of the country. The island of Atauro is also part of the Timorese territory; it is located in the north of the mainland, with the fourth area being the small island of Jaco. The Savu Sea lies north of Oecusse. Timor-Leste is about 265 kilometres long and 97 kilometres wide, with a total land area of 14,874 Km2. The country is situated between 8’15S – 10’30S latitude and 125’50E – 127’30E longitude. The country's coastline covers around 700 kilometres, the main land border with Indonesia is 125 kilometres long, and the Oecusse land border is around 100 kilometres. Maritime borders exist with Australia to the south and Indonesia elsewhere.

Timor-Leste is ringed by coral reefs teeming with marine life. The country has tropical weather, heavily influenced by the West Pacific Monsoon and its mountainous climate. The wet season is between December and May, and the dry season is between June and November, with the southern parts of the country experiencing a longer wet season of seven to nine months. In the past year, tropical cyclones have been more active in the region, adding an extra threat to the population.

Timor-Leste's meteorological services provision and responsibilities are under the National Directorate of Meteorology and Geophysics (DNMG), which is under the Ministry of Transports and Communications. The hydrological services are the responsibility of the National Directorate for Water and Sanitation (DGAS).

CHD methodology

The Country Hydromet Diagnostics (CHD) work preceded preparing the National Gap Analysis and Contribution Plan. Working towards these documents was a good platform to become familiar with the Systematic Observations Financing Facility (SOFF) CHD topics and identify a practical way to conduct CHD work.

During the SOFF Readiness project, the project execute team organised the following activities:

- The Finnish Meteorological Institute (FMI) organised a remote workshop in April to review gaps in terms of Global Basic Observing Network (GBON) compliance, followed by planning the first mission for the Gap Analysis document.
- The Meteorological, Climatological, and Geophysical Agency (BMKG) experts visited Timor-Leste in June for a week-long workshop with DNMG experts, including a field trip to the weather stations in Dilli and Baucau surface weather stations in Timor Leste.
- For the National Contribution Plan, FMI and BMKG experts visited Dili for ten days in a joint mission to prepare the SOFF National Contribution Plan and work in the CHD on 20-30 August 2023.

- Three working days were used to work on the National Contribution Plan document after having the Gap Analysis document approved by the SOFF secretariat.
- The preparation of the Country Hydromet Diagnostics (CHD) was divided into three steps:
    - For two days, the FMI and BMKG experts worked together with the DNMG experts on different documents provided by WMO to collect the needed information from DNMG for the meteorological information and the National Directorate for Water and Sanitation for the hydrological information.
    - Second, after the needed information was collected, a workshop was organised with the technical staff of the different stakeholders of DNMG to get their viewpoints on the DNMG activities and needs; the results were reflected in the summary Excel file provided by WMO and the inputs included in CHD document.
    - Finally, to ensure that the different stakeholders agreed with the findings, a high-level workshop was organised with the different stakeholders to socialise the results and get the last inputs.

Chapter 2: Country Hydromet Diagnostics

Element 1: Governance and institutional setting

1.1 Existence of Act or Policy describing the NMHS legal mandate and its scope

The activities and regulations of DNMG are included under the General Directorate of Transportation and Communication: The Directorate-General for Transport and Communications, hereinafter called the DGTC, is responsible for ensuring the integrated general direction and coordination of all services Ministry of Transport and Communications with assignments in the areas of land and sea transport, the meteorological services and geophysics, postal services, and networks of Ministry of Transport and Communications and Government[1].. For Risk Disaster Management, the secretary estate of Civil protection under the Ministry of the Interior is responsible for the regulation. The risk plan is from 2005[2]..

Within the General Directorate of Transport and Communications tasks, the DNMG responsibilities are defined in the following items:

b) Improve the legal and regulatory framework for land and sea transport, meteorological services, postal services and networks of communication, including the promotion and definition of technical standards and regulations in these areas.

j) Develop, in collaboration with other relevant governmental agencies, national and international information systems and meteorological monitoring, climatology and seismology, as well as ensuring the provision of public services in this area.

The National Directorate for Water and Sanitation (DGAS) is a separate institution under the Ministry of public works.

1.2 Existence of Strategic, Operational and Risk Management plans and their reporting as part of oversight and management.

[1] http://www.mtc.gov.tl/mtc/index.php/explore/organs
[2] https://www.laohamutuk.org/Oil/LNG/Refs/084NDRMP.pdf

DNMG prepares a yearly report for the Secretariat of Transportation and Communication. The report prepared for 2021 is included in the annex 6 in Tetuan language. Last year's report was not prepared because of the government elections period. The Risk management plan is under the Civil Protection Authority. The Civil Protection Authority organises a monthly meeting to prepare the action plan and report the previous activities. The meeting involves all the institutions responsible for risk management actions. The institute needs a strategic plan for the medium-long term; currently, it is non-existent. DNMG makes a planning at the yearly level.

1.3 Government budget allocation consistently covers the needs of the NMHS in terms of its national, regional, and global responsibilities and based, among others, on cost-benefit analysis of the service. Evidence of sufficient staffing to cover core functions

DNMG's total budget for 2023 was 400,000 USD, from which 180,000 USD are used to pay the Bureau of Meteorology of Australia (BoM) for the provision of services for aviation, while the total cost for DNMH staff salaries is 150,000 USD. The remaining budget (70,000 USD) is what DNMG has for operation and the maintenance of the station and supplies. The institute needs a medium-long term financial plan to secure the needed resources for operation, especially now that they will get new infrastructure from the UNEP project.

1.4 Proportion of staff (availability of in-house, seconded, contracted- out) with adequate training in relevant disciplines, including scientific, technical, and information and communication technologies (ICT). Institutional and policy arrangements in-country to support training needs of NMHS.

The Timor-Leste government has a national training policy to handle the National Institute of Public Administration (INAP), especially for public employees. To apply for support, every public institution must present a plan; in the case of DNMG, the proposal needs to be submitted by the Ministry of Transportation and Communication, and the financial support, if approved, will be added to the Ministry budget. For undergraduate students, the government has a national scholarship program managed by the Human Capital Development Funds (FDCH) to support young Timorese to get a university degree in national or international universities. Internationally, the support programs are managed at the embassy level, especially for postgraduate students.

DNMG has in total 42 persons working at the institute. DNMG employees are distributed as follows:

- 7 meteorologists, (also working as Weather and Climate Forecasters): 1 person with MSc (Atmospheric Science), and 1 person with a degree in meteorology, who is due to retire soon.
- 4 climate staff: Telecommunications and Information degrees.
- 3 staff in the IT Section with a degree in Information Technology (2 of them paid by UNEP GCF FP-171 project)
- 8 meteorological observers
- 3 technical staff for instruments calibration and maintenance (Paid by UNEP GCF FP-171 project)
- The remaining staff are in administration and finance.

The Timor-Leste National Directorate for Water and Sanitation (DGAS) has one person responsible for each station, 5 hydrologist and the institute's director. In total there are 47 Hydrological Technician and 5 hydrologists; in total the institute has 52 persons working on it.

1.5 Experience and track record in implementing internationally funded hydromet projects as well as research and development projects in general.

Timor-Leste has established collaboration with UNICEF, PARTISIPA and other national and international NGOs and agencies in terms of record archiving and data on water resources, including urban and rural water supply information. Recently, its system with SIBS was developed by WaterAid agency. More collaboration and engagement are needed to enhance data management and capacity. The institute has the ongoing projects:

- Installation of weather station equipment (2 stations). Include training and Awareness (financed by WaterAid) (2023).
- Pilot project for soil and water conservation to minimise the risk of flooding drought in Dili area catchment (financed by the National government).
- Plan for pilot assessment for 4 catchments conservation in 2 other municipalities (Ainaro & Viqueque) (financed by UNICEF).
- Pilot survey to identified types of conservation for upstream of Tohumeta intake because this water intake as a mean water source for Dili Capital Urban Water Supply so far. Finalised in 2022 (financed by UNICEF). [3]
- Democratic Republic of Timor-Leste: Dili wastewater supply project (financed by the Asian Development Bank) (2023-2030)[4]

Summary score and recommendations for Element 1

Maturity Level 2

Despite de effort of the national government to formalise the hydrometeorological institutes services and the support of the international donors there some points where the country needs to make a mayor effort. The following are the main findings in the Governance and institutional setting:

- Both the DNMG and DGAS resources are limited for operation, the current budget covers only the basic operations of the institutes. It is recommended that the Timorese government increase the institute assignments considerably to secure the proper operations.
- The budget increase must cover the increase of the DNMG and DGAS staff, especially for the network maintenance and the management system operations.
- The DNMG and DGAS must develop a strategic and financial plan to secure long-term operations and to plan the expansion of the institute's activities.
- DNMG must have independence for the institute operations, including autonomic decisions in financial planning and spending.
- The DNMG must have a legislative act to regulate and give the mandate for primary responsibilities in the country.

[3] https://www.unicef.org/timorleste/media/5911/file/UNICEF_TIMOR_LESTE_INVESTMENT_CASE_WASH_Final.pdf

[4] https://www.adb.org/sites/default/files/project-documents/54429/54429-001-rrp-en.pdf

- DNMG and DGAS must implement a long-term strategic and cooperation plan between the different institutions.
- Fair salaries and working conditions must be promoted at DNMG and DGAS to secure the personnel's stability and avoid the brain drain.

Element 2: Effective partnerships to improve service delivery

2.1. Effective partnerships for service delivery in place with other government institutions.

DNMG does not have any permanent services provision; some services are given upon request, especially for the data provision, but the capacity to do it is low. DNMG provides the forecast to the public on TV, radio when requested. DNMG works with the local government in the Dili Catchment area for early warning information.

2.2. Effective partnerships in place at the national and international level with the private sector, research centres and academia, including joint research and innovation projects.

DNMG works with the NGO's Local and Private Sector when under request, especially for the Tourism Sector. The data provision is given upon request. After the institute develops its capacities, it is expected to approach the private sector to discuss their needs and future cooperation.

2.3. Effective partnerships in place with international climate and development finance partners.

DNMG has an ongoing project with UNEP that will help the institute improve its infrastructure and human resources capacity. It is expected that support will continue in future with the SOFF program. BoM provides the forecast for aviation services, although the weather stations are the responsibility of DNMG.

2.4. New or enhanced products, services or dissemination techniques or new uses or applications of existing products and services that culminated from these relationships.

Currently there is no product development at DNMG, but it is expected that after the UNEP project ends, DNMG will have a forecasting centre that will facilitate the forecast production more than once a day and support the development of different products.

Summary score, recommendations, and comments for Element 2

Maturity Level 1

Overall, the different institutions work in isolation and do not value or promote partnerships; the cooperation between the different instructions must be framed under a Memorandum of Understanding (MoU) that must be updated over time. The main findings and recommendations to proceed with effective partnerships and to improve service delivery are:

- The cooperation between the different institutes involved in hydrometeorological services and climatology is limited; more cooperation and interactions are needed to develop service provision. Mid-Long-term planning needs to be developed.
- The private sector needs to be considered in the provision of the services and must be involved in the institute's strategic plan when it is built up; after the institute improves,

a tailored brochure tackling the private sector needs should be proposed. It will secure the support of the private sector on the DNMG expansion.

- To strengthen the cooperation between the regional meteorological institutes that must be promoted and supported, specific calls like the WMO twinning program should be reinforced in the region to facilitate the less developed institutes to get support.
- To bring the University activities closer to DNMG, should be promoted to facilitate the inclusion of talented professionals in the institute.

Element 3: Observational infrastructure

3.1. Average horizontal resolution in km of both synoptic surface and upper-air observations, including compliance with the Global Basic Observing Network (GBON) regulations.

DNMG has 15 stations installed, from which none are fully operational or have the conditions to be improved. DNMG does not have AWS that are incompliance the GBON requirements and there is no upper-air observation station in the country.

UNEP under the GCF-funded project "Enhancing Early Warning Systems to build greater resilience to hydro-meteorological hazards in Timor-Leste" project will provide surface stations to the country (Figure 1)[5].

It is recommended to include 9 Automatic Weather Station (AWS) and 2 Automated Weather Observing System (AWOS) installed under the UNEP project in the maintenance plan of the SOFF project under the last year of the Investment phase and the subsequent years of the Compliance phase, as per the sustainability strategy of the GCF project. SOFF funding will be critical to ensure sustainability of these stations which are required for more accurate weather and climate forecasting in Timor-Leste due to its extreme mountainous topography. The sustainability strategy of the GCF project was previously discussed and agreed to by the WMO representatives during the project development stage.

Figure 1. Map of the stations to be installed under the GCF-funded project.

[5] https://www.greenclimate.fund/project/fp171#documents

3.2. Additional observations used for nowcasting and specialized purposes.

The DNMG existing network includes only Automatic Weather Stations (AWS) and Automated Weather Observing System (AWOS) (for aeronautical meteorology). Under the UNEP project, DNMG will acquire 3 dual-polarisation X-band Doppler weather radars. [6]

Although the radars will significantly benefit the country, many challenges must be addressed to keep the network operational. The cost of a radar operation is beyond the scope of the DNMG's financial capacity. To ensure that the planned investment has the expected impact, extensive financial support is needed for DNMG to secure the institute operations. Third parties operate 82 Automatic rain stations in the country, but the working conditions are unknown.

3.3. Standard Operating Practices in place for the deployment, maintenance, calibrations and quality assurance of the observational network.

The DNMG does not have SOPs in place for deployment, maintenance, calibration and QA of its observational network. The current network has no stations fully operational, and the last calibration of the instruments was 10 years ago. The data communication is handled manually for all the stations, and the institute has no proper database or data management system.

The ICT infrastructure and the data management system will be implemented within the UNEP project. The DNMG will need training support for WMO Integrated Global Observing System (WIGOS) and WMO Information System (WIS) data transmission. The system will be designed following WMO standards for data transmission, exchange, and management. Although BMKG is providing training within the UNEP project, DNMG does not have enough personnel to be trained; it is expected that under the SOFF project, all the needed support for the ICT system operations and maintenance will be financed as well as the incorporation of new experts that needs to be hired. When the new experts are contacted, extra training needs to be organised.

3.4 Implementation of sustainable newer approaches to observations.

UNEP will provide the needed systems for the implementation of WIGOS. The SOFF program must support the training of the experts and maintenance and updates of the system to secure the sustainability and the data provision.

It is expected that the Timorese government will assume the maintenance cost of all new stations; for that, it is expected that DNMG make a strategic financial plan to cover all the needed expenditure and present it to the Ministry of Transportation and Communication for approval, limited to financial resources available at the ministry.

3.5. Percentage of the surface observations that depend on automatic techniques.

All the data transmission is handled manually; there is a need to build data management and transmission systems for all networks. UNEP will start the work, but more support is needed to secure the network operation.

Summary score, recommendations, and comments for Element 3

[6] https://www.greenclimate.fund/sites/default/files/document/funding-proposal-fp171.pdf

Maturity Level 1: DNMG has no existing or limited services and capacity to operate the basic surface observations and no upper-air observations. The most significant findings in Observational infrastructure are:

- It is recommended to include 9 AWS and 2 AWOS installed under the UNEP- GCF funded project for maintenance under the last year of the Investment phase and the subsequent years of the Compliance phase, as per the sustainability strategy of the GCF project. SOFF funding will be critical to ensure sustainability of these stations which are required for more accurate weather and climate forecasting in Timor-Leste due to its extreme mountainous topography.
- The UNEP- GCF project will implement the management system for DNMG. Within the SOFF program, it is expected that DNMG will have needed support to maintain the system. More support is required through the SOFF project, especially to secure the network and the management system operation to secure the near real-time data transmission requested by GBON.
- SOFF will support the radio-sounding system operations, including the needed supplies. The DNMG must secure the needed experts for station operations after the SOFF. Update trainings are required to ensure the up-to-date operation of the network.
- The 3 new radar networks implemented by the UNEP-GCF project will need a significant investment for the radars maintenance and operation. The current resources of DNMG do not guarantee the radar operation in the short term. The investment must include new personnel responsible for the radar operation and maintenance.
- Although DNMG will have a new radar network, the institute does not have expertise in nowcasting. The DNMG forecasters will need training in the radar data analysis and nowcasting production.
- The DNMG forecasters need training in aviation forecasting; the aviation forecast is currently subcontracted to BoM. The DNMG will also need to get all the needed certifications for aviation forecast operations. The DNMG also lacks expertise in maritime forecasting; an extensive training program is needed to support the forecasters to secure the institute's proper operation.
- The sustainability of the DNMG operation will need sizeable financial support to secure the proper operation of the institute.

Element 4: Data and product sharing and policies

4.1. Percentage of GBON compliance – for how many prescribed surface and upper-air stations are observations exchanged internationally. Usage of regional WIGOS centres.

DNMG does not have AWS that complies with the GBON requirements, and there are no radio soundings stations in the country. All the transmission is handled manually. As mentioned in the previous section, the UNEP-GCF project will provide a surface station to the country[7]. It is recommended that the stations installed under the UNEP project are included in the maintenance plan of the SOFF under the last year of the Investment phase and the subsequent years of the Compliance phase. The map of stations locations is added

[7] https://www.greenclimate.fund/sites/default/files/document/funding-proposal-fp171.pdf

in the Figure 1. The sustainability strategy of the GCF project was previously discussed and agreed to by the WMO representatives during the project development stage.

4.2. A formal policy and practice for the free and open sharing of observational data.

The DNMG does not have any data policy. For data provision, different institutes in Timor-Leste signed an MoU for cooperation. The DNMG and the hydrometeorological institute must implement data policies to facilitate data sharing within the country. The works for the policies implementation must start in the SOFF project.

4.3. Main data and products received from external sources in a national, regional and global context, such as model and satellite data.

DNMG receives:

- European Centre for Medium-Range Weather Forecasts (ECMWF) model localized for the country, South-eastern Asia-Oceania Flash Flood Guidance (SAOFFG) flash flooding guidelines.
- Maritime forecast from BMKG, earthquake information.
- Radar images from BMKG, tropical cyclone advisory from BoM.
- FOCUS interface for monthly and seasonal forecasts from Regional Integrated Multi-Hazard Early Warning System (RIMES).
- Data exchange platform from RIMES. The RIMES provide the forecast for Timor-Leste.
- BMKG's signature platform for producing impact-based forecasts.

Summary score, recommendations, and comments for Element 4

Maturity Level 1: No observational data is shared internationally. DNMG's primary services do not allow them to share the data, the institute does not have any data sharing policies or practices, and the existing infrastructure does not allow data sharing. The main findings and suggestions are included here.

- DNMG needs support for the network operation and maintenance to secure the data provision for the GBON; near real-time data will be possible if DNMG sets up an automatic data transmission for the AWS.
- To build the data policies in Timor-Leste, it must be considered in the short term that the signature of MoU within the institutes is inefficient and does not guarantee cooperation.
- The DNMG has access to various data sets provided by international organisations, but the use is mainly in charts. Proper access to data is needed to ensure that DNMG can update the forecast and model supplied according to the Timor-Leste conditions, which will help DNMG improve the forecast. It applies to satellites and models data.

Element 5: Numerical model and forecasting tool application

5.1. Model and remote sensed products form the primary source for products across the different forecasting timescales.

DNMG uses satellite charts and primary the ECWMF model images and the available data in the RIMES platform to produce the forecasts. DNMG produces a daily and monthly forecast.

Other models used by DNMG are WINDY, an open-access model that is part of the ECWMF assembly, run in the Czech Republic. The WRF version of the BMKG; DNMG, also uses VENTUSKY (part of the National Oceanic and Atmospheric Administration (NOAA) assembling) run by the Czech Republic EARTHNULL model. The use of the model is limited. RIMES will develop the system for Timor-Leste and install WRF in the near future, some trainings have been given but forecasters do not have enough knowledge to use it.

5.2. a) Models run internally (and sustainably), b) Data assimilation and verification performed, c) appropriateness of horizontal and vertical resolution.

DNMG does not have the tools or capacity to process model data; DNMG uses the charts of the ECMWF global model for forecasting, and there is no specific fit for Timor-Leste on the model. DNMG uses FOCUS, a tool provided by RIMES that is also available for multi-model ensemble analysis, such as GFS and ICONE, among others. It uses ERA5 with a horizontal Resolution of 0,25 degrees and CHIRPS for 0.05 degrees. The models are used without any editing from DNMG forecasters. Based on the forecaster's experience, The model gives an accurate value for the country.

5.3. Probabilistic forecasts produced and, if so, based on ensemble predictions.

There is no model use on the forecast production.

Summary score, recommendations, and comments for Element 5

Maturity Level 1: DNMG has no expertise in modelling processing or development. There is a need to focus on the following points:

- The DNMG forecast depends heavily on external data providers; the institute needs to develop its systems and capacities further to produce its own forecast.
- DNMG forecast office must acquire software and hardware for forecast production and train the forecasters in using the tools and in the forecast production by combining different data.
- The forecasters need training in producing specialised forecasts for aviation and maritime forecasts.
- There is a need for model use and development for the DNMG forecasters; currently, the model is used only visually. To support regional model for the country; currently they only use global models.
- DNMG forecasters need to be more familiar with satellite data; currently, the use of satellite data is limited.
- Although DNMG will improve the data network from the UNEP project and the SOFF project, data processing and analysis support is needed, especially for the new data available from the radar and radio sounding.

Element 6: Warning and advisory services

6.1. Warning and alert service cover 24/7.

DNMG does not operate 24/7; the forecasters work from Monday to Friday, 8 hours a day; the airport's observers work 12 hours a day, 7 days a week.

For Timor-Leste, the national authority responsible for issuing the alerts is civil protection. During the rainy season, the DNMG forecasters are available 24/7 (November-March), especially when risk alerts for tropical cyclones, heavy rain or thunderstorms are provided. The Risk is usually followed up 7 days before it occurs, and the alert is issued 3 days before the event or at least 1 day before the hazard hits.

6.2. Hydrometeorological hazards for which forecasting and warning capacity is available and whether feedback and lessons learned are included to improve warnings.

DNMG forecast cyclones, heavy rain, thunderstorms, strong wind, landslides and heat waves. Flash flood warnings are starting to be warned now. DNMG also monitors the El Niño-Southern Oscillation (ENSO) conditions. The feedback comes mainly through a WhatsApp platform. However, there are no protocols or processes to follow up on the warning's verification or processes for lessons learned.

6.3. Common alerting procedures in place based on impact-based services and scenarios taking hazard, exposure and vulnerability information into account and with registered alerting authorities.

DNMG provide warnings in a Common Alerting Protocol (CAP) to some extent since 2022. There is a need to develop SOPs for the different hazards. DNMG communicates with the stakeholders mostly via WhatsApp, calls and email.

Summary score, recommendations, and comments for Element 6

Maturity Level 2: Basic warning service is in place and operational but with limited public reach and lacking integration with other relevant institutions and services. The main points to be considered in the coming years are:

- The DNMG does not have a person responsible for the risk management. Training in risk management and Hydrologist master's degree specialist is needed. DNMG will have one expert studying for a master's degree in risk disaster management. To secure the return of the expert, offering fair work conditions and salary must be considered by DNMG.
- The timing to produce the alerts should be reduced to give the authorities more time to prepare the contingency plan. DNMG needs more support to improve the early warning provision. The tools that forecasters use to prepare the forecast are minimal.
- The communication of the alerts needs to be better dissemination and follow-up. DNMG must improve its outreach and communication tools; the use of social media and basic communication tools at DNMG is limited.
- The DNMG needs to increase the human resources capacity to be able to operate 24/7, give more training for the forecasters in specific forecasts, and improve the facilities and tools of the forecast office.

Element 7: Contribution to Climate Services

7.1. Where relevant, contribution to climate services according to the established capacity for the provision of climate services.

The Ministry of Environment, through the Climate Change directorate, is developing a Climate change policy; it includes the DNMG support as a data provider[8] . Additionally, RIMES will prepare the national framework for climate change impact in Timor-Leste. At the ministry level, the government is also developing a law for climate change and a carbon footprint policy.

DNMG has provided occasional training for farmers about climate change, but permanent support is needed for this activity. DNMG also organised a yearly workshop about climate and weather for the local authorities, and a few workshops have also been organised for women in agriculture related to climate and climate change. During the workshop for women in agriculture, the participants received a mobile phone to facilitate access to the weather information provided by DNMG. DNMG constantly participates in different events as speakers on weather and climate-related issues. To keep up.to-date, the DNMG expert has been getting training from RIMES, BMKG, and JMA on climate change.

Although the Timor-Leste government are working on different policies related to climate change and black carbon, it is still at an early stage; prioritisation of the policies and giving a clear mandate to the different institutions that are involved in climate-related activities need to be defined to avoid overlapping work and to facilitate the interaction between the different institutions.

DNMG has a basic service provision related to climatology for different stakeholders. DNMG experts need training support in climate services and climatology data processing analysis and application, especially for agrometeorology, since it is one of the core economic resources of the Timor-Leste economy. DNMG does not have any user interface since the product services are basic, but it is something that DNMG and the other entities in the country need to work on together to develop it to have any provision and application of climate services. Currently, there is no socioeconomic monitoring or evaluation, but more products and services need to be developed, and for that, the DNMG needs to increase the know-how and capacity of development.

Summary score, recommendations, and comments for Element 7

Maturity Level 2: DNMG has basic capacity for climate services provision. The main points to consider are:

- The DNMG cannot generate long-term climatology. DNMG experts need training in data processing, data analysis, climate prediction, and impact-based forecasting and the necessary tools to produce climatologic maps and a proper database.
- DNMG must develop climatologic products to cover the stakeholder's needs to better support the socio-economic impact of the country based on climate effects, given that the country's economy core is based on tourism, petroleum and agriculture. Besides, DNMG will need communication tools to disseminate their results.
- DNMG must join efforts with the Ministry of Agriculture to improve and maintain the agrometeorology network. The Ministry of Agriculture has 11 stations, but the instruments are not maintained or calibrated. It is recommended that all the

[8] https://www.laohamutuk.org/Env/Climate/2023/220301GovRes8NationalClimateChangePolicyEn.pdf

meteorological networks are under the DNMG and that all the institutions interested in the data support the network maintenance. The data must be accessible for all the institutions that need the information under data policies.

- DNMG must improve the internal communication with the different institutions, especially between the National Directorate for Climate Change (DNAC) and the Ministry of Agriculture.

Element 8: Contribution to hydrology

8.1. Where relevant, standard products such as quantitative precipitation estimation and forecasts are produced on a routine basis according to the requirements of the hydrological community.

The DGAS provides information about wastewater liquid and solid. The Timor-Leste government uses the data for internal regulation.

The DGAS has a manual database; the data provision is given upon request to different stakeholders, following the previous signature of a MoU. There are no ISO standards at the institute. The implementation of ISO standards must be implemented to secure the data accuracy. The institute does not provide a hydrological forecast.

The cooperation between the DGAS and DNMG is not regular and is based on under-request. A MoU is needed for the collaboration; currently, the two institutions have no valid MoU.

8.2. SOPs in place to formalize the relation between Met Service and Hydrology Agency, showing evidence that the whole value chain is addressed.

The DNMG and the Hydrological Institute had an MoU for cooperation, but it expired. Although the institutes communicate, there is no proper cooperation between them, and the value chain is non-existent.

The hydrology institute is part of the National Directorate for Water and Sanitation under the Ministry of Public Works. Although the institute is responsible for maintaining the networks and collecting the data, there are not enough resources for operations. Similar than in DNMG, the instruments lack maintenance and calibration, and the institution needs an expert responsible for the maintenance operation as well as for building a proper ITC system for the data collection and data management system for the data QA and QC of the data, as well as for the data distribution. As in DNMG, the calibration of the instruments should be outsourced. In addition, the institute must have a laboratory for water quality.

8.3. Data sharing agreements (between local and national agencies, and across international borders as required) on hydrological data in place or under development.

As proposed to DNMG, the DGAS must develop data policies and agreements and improve the data network. Currently, there is no ongoing agreement between the two institutions for cooperation.

8.4 Joint projects/initiatives with hydrological community designed to build hydrometeorological cooperation.

As mentioned in Element 1 UNICEF has been supporting the institute with different projects for the equipment acquisition. However, there is a need for more support in the near future for water conservation. To secure the water supplies, there is a need for 6 stations and raingate stations.

Summary score, recommendations, and comments for Element 8

Maturity Level 1: DNMG and DGAS have very little interaction. Meteorological input is used very little in hydrology and water resource management. The main finding and recommendations are:

- The Hydrological Institute has similar conditions than DNMG. The institute needs training for the hydrologists on specific topics.
- The existing infrastructure needs to be maintained and calibrated, and some stations need to be updated.
- The institute's management needs training support for financial and strategic planning.
- The institute does not have a database, and all the data transfer and processing are handled manually. The institute must get support to automatise its processes.To support the maintenance and calibration of the institute, there is a need to hire technical personnel for the work.The institute also lacks ICT personnel; the institute must increase in this field, too.

Element 9: Product dissemination and outreach

9.1. Channels used for user-centred communication and ability to support those channels (for example, does the NMHS operate its own television, video or audio production facilities? Does it effectively use cutting-edge techniques?).

There is a need for a speedy internet connection for communicating the alerts. The national TV channel in Timor-Leste (RTTL) used to present the weather forecast daily, but due to technical problems, the transmission stopped. Although the alerts are disseminated through different channels, it does not ensure that they reach the entire population, especially in rural areas where basic services are not always available. Access to an internet connection is also limited, making it necessary to keep basic communication channels. The institute needs support for developing audio-visual communication, starting with the website; a professional in the field must be considered for the institute. Cooperation between the RTTL and DNMG must be promoted for weather and alert dissemination.

9.2. Education and awareness initiatives in place.

DNMG organise workshops in different regions to create people's awareness, but the institute must develop social media products to reach the youth.

9.3. Special measures in place to reach marginalized communities and indigenous people.

DNMH does not have any material support for different populations. NGOs (CARE) have prepared some visual material for children to inform them about the risks, but social media

needs to be more active to cover the youth population and increase the basic information channels to reach the elderly community.

Summary score, recommendations, and comments for Element 9

Maturity Level 2: DNMG uses the traditional communication channels and an online blog to disseminate forecasts and basic information. Facebook and WhatsApp are the most used social media at the Institute. The main findings and recommendations to improve product dissemination and outreach are:

- DNMG needs support to develop social media and audio communication; only Facebook and WhatsApp are currently used. The DNMG must have a website to disseminate the weather forecast.
- DNMG needs qualified personnel in social media and proper tools to produce and broadcast the forecast and alerts on social media.
- DNMG should develop target material for the different groups of the society. Currently, only material for kinds produced by the NGOs about climate change impact exists.
- Communication and cooperation must be promoted between the different government institutions.
- DNMG must promote more training programs for the different groups of society, especially at the schools and in the media, to learn about meteorological terminology to better understand the impact of the different climatological disasters.
- DNMG should create awareness in the private sector about the benefits of having a solid meteorological institute and develop specific products in the country to sieek financial support to keep highly quality services.

Element 10: Use and national value of products and services

10.1. Formalized platform to engage with users in order to co-design improved services.

DNMG does not have any formalized platform in place. DNMG has a blog to publish the forecast daily. Facebook is used to socialise the weather forecast and extreme weather conditions information (extreme weather conditions can reach up to 1000 views). The communication with the stakeholders is made mostly via WhatsApp. The aviation services are subcontracted to Bureau of Meteorology of Australia (BoM). The UNEP project document includes an overview of the socioeconomic conditions in Timor-Leste due to weather factors, but further analysis is needed based on the evolvement of the DNMG capacity for services provision. DNMG will be included in the Pacific Climate Change Science Program (PCCSP) for a climate impact and projection study.

Facebook follower:15000 WhatsApp: 151 members, email communication is used. DNMG organises a multi-sector biannual meeting. The private sector has a small role, and the DNMG's contribution is mostly data provision.

10.2. Independent user satisfaction surveys are conducted, and the results used to inform service improvement.

DNMG collects the comments from Facebook and WhatsApp. For alerts, the information is produced in 3 languages: English, Tetum and Portuguese. DNMG experts have internal discussions when there is negative feedback from the users.

10.3. Quality management processes that satisfy key user needs and support continuous improvement.

There is no quality management processes at DNMG.

Summary score, recommendations, and comments for Element 10

Maturity Level 1: DNMG Service development lacks any routine stakeholder feedback practice. DNMG must focus in the products preparation for the different stakeholders and build together with them a feedback to improve their services provision. The main findings are:

- DNMG must involve the different institutions, including the private sector, to evaluate the country's needs related to weather and climate to develop the DNMG services catalogue.
- After DNMG develop the product catalogue and the services, it should implement a quality management process and evaluation of the services.

Annex 1 Consultations (including experts and stakeholder consultations)

List of Stakeholders Participating in the Two Days Workshop		
No	**Institute**	**Position**
1	Ministry of Transport and Communication (MTC)	General Director
2	National Directorate of Meteorology and Geophysics of Timor-Leste (DNMG)	Director and staff
3	Air Navigation	Director of Air Navigation (AACTL-IP)
4	Air Navigation	Director of Air Traffic Control (ANATL-IP)
5	Nacional Authority for Civil Protection (APC-IP)	President
6	Ministry of Agriculture and Fisheries	National Directorate for Politic Planning and Monitorization (ALGIS)
7	Ministry of Environment	National Designated Authority (NDA)
8	Ministry of Environment	National Directorate for Climate Change
9	NGO's	Mercy Corps Country Director
10	UN Agency	Assistant of Food Agriculture Organization (FAO)
11	UN Agency	Chief of IOM Mission
12	UNEP	Technical Adviser
13	Red Cross	General Secretary of Red Cross Timor-Leste
14	RIMES	Country Coordinator
15	Ministry of Public Works	National Directorate for Water and Sanitation
16	IFRC	Technical Adviser
17	F-FFDTL	Air Component of F-FDTL
18	National Authority for Tourism/Ministry of Tourism	President
19	Ministry of Planning and Strategic Investment (MPIE)	National Directorate of Geospatial Data(DNDG)

DNMG, FMI and BMKG CHD document's preparation

DNMG, FMI and BMKG workshop together with the DNMG stakeholders (technical staff)

DNMG, FMI and BMKG workshop together with the DNMG stakeholders high-level meeting

Annex 2 Urgent needs reported

DNMG needs to develop their weather forecast and climatological services provision capacity; for that, the DNMG infrastructure and investment capacity need to improve to be able to keep the upcoming measurements network working. The most urgent needs can be summarized as follows:

- The weather forecasting and early warning process is produced manually and lacks new modern software and tools for automation, dissemination, and to allow forecasters to devote their expertise. DNMG must have a better set-up for the forecast office software tools to integrate the different measurements that are going to be provided by the new weather stations, radars and radio sounding, as well as the satellite and model data needed to improve the forecast; the forecasters must get training on the use of the new tools. It will help DNMG to improve the time and accuracy of the warnings to the stakeholders so that they can serve the Timorese society better.
- DNMG will have 3 new radars that will allow them to produce nowcasting services and improve the early warning services. For that, DNMG forecasters will need training in nowcasting and radar data analysis and in the compose production of the data. This training is imperative since it is expected that the new radars are going to be operational in the coming years.
- DNMG forecasters are in high need of training in forecast production for aviation and maritime forecasts. Currently, BoM is responsible for weather aviation, and there is no production of the marine forecast.
- The DNMG observation system has some critical gaps that do not currently allow an efficient delivery. The UNEP project will improve the network, the database and the data management system, but DNMG must secure the data chain production operations to ensure data sharing, especially for the GBON. The number of IT staff and maintenance personnel must be increased to guarantee sustainability.
- DNMG must develop SOPs for all the activities and operations to secure the production chain at DNMG. Despite hiring new personnel, training and assistance to develop the SOPs are needed.
- DNMG does not have any long-term financial or operation plan; it is recommended to support the DNMG directives in preparing the long-term planning by training in Strategic Management and financial management to develop medium-long-term strategic planning.
- To secure the needed expertise at DNMG, the working conditions for the DNMG experts must be fair, and salaries must be improved at DNMG to avoid the brain drain.
- The cooperation between other governmental authorities should be further strengthened, especially with the DGAS, the Centre for Climatology under the Ministry of Environment and the Ministry of Agriculture, to secure the best use of resources and staff and not overlap the activities but the contrary to integrate efforts. The development of data sharing policies needs to be developed in the near future. New partnerships should be established with the NGO sector to allow efficient use of information provided by DNMG by the grassroots level users. Also, cooperation with the private sector needs to be explored.

- The information chain must be completed with a new communication tool at DNMG to develop a website and other communications tools to disseminate the forecast and warnings is an imperative activity for DNMG.

Annex 3 Information supplied through WMO

During the high-level meeting, a PowerPoint presentation provided by WMO was used to introduce the CHD needs. Before the work started, FMI experts met WMO about the CHD activities and expectations.

- WMO Monitoring System Data
- WMO EW4All Rapid Assessment for Pillar-2
- WMO Hydrology Survey
- Data from Checklist for Climate Services Implementation

Annex 4 List of materials used

In addition to WMO guides, the following material was utilised:

- Documentation provided by DMNG.
- Online Material about the different policies and regulations in the country
- Different Timor-Leste government websites
- UNEP project documents related with the ongoing project.

Annex 5 List of Abbreviations

AWOS	Automated Weather Observing System
AWS	Automatic Weather Station
BMKG	Meteorological, Climatological, and Geophysical Agency
BoM	Bureau of Meteorology of Australia
CAP	Common Alerting Protocol
CHD	Country Hydromet Diagnostics
DGTC	Directorate-General for Transport and Communications
DGAS	National Directorate for Water and Sanitation
DNMG	National Directorate of Meteorology and Geophysics
ECMWF	European Centre for Medium-Range Weather Forecast
ENSO	El Niño-Southern Oscillation
EWS	Early Warning Services
FDCH	Human Capital Development Funds
FMI	Finnish Meteorological Institute
GBON	Global Basic Observing Network
MoU	Memorandum of Understanding
NGO	Non-Governmental Organization
NMS	National Meteorological Service
NOAA	National Oceanic and Atmospheric Administration
NWP	Numerical Weather Prediction
QA/QC	Quality Assurance/Quality Control
RIMES	Regional Integrated Multi-Hazard Early Warning System
SAOFFG	Southeastern Asia-Oceania Flash Flood Guidance
SOFF	Systematic Observations Financing Facility
UNEP	United Nations Environment Programme
WIGOS	WMO Integrated Global Observing System
WIS	WMO Information System
WMO	World Meteorological Organization
WRF	Weather Research Forecast

Annex 6 DNMG yearly report for the Secretariat of Transportation and Communication - 2021

REPÚBLICA DEMOCRÁTICA DE TIMOR LESTE

RELATÓRIO ANAUAL METEOROLOGIA E AKTIVIDADE TINAN 2021

DIRASAUN NASIONAL GEOFÍSICA PROGRAMA NO

MINISTÉRIO DOS TRANSPORTES E COMUNICAÇÕES
DIREÇÃO GERAL DOS TRANSPORTES E COMUNICAÇÕES

Prepara husi:

Terencio Fernandes Moniz
Director

KONTEÚDU

Intrudusaun

Direção Nacional de Meteorologia e Geofisica (DNMG) hanesan Dirasaun ida nebé tutela ba Direção Geral Transportes e Comunicações no iha subrinha Ministerio Transportes e Comunicações nia okos. DNMG mos adere ba Organizasaun Meteorologia Mundial/Word Meteorology Organization (OMM/WMO) desde dia 4 de Dezembru de 2019. DNMG nia papel mák prepara no autuliza informasaun Meteorologia e Geofisica nebé ma'k akuradu no hó horas ba Publicu, Agricultura, Aironotica, Maritima, Infra-estrutura, Turismo, Industrial no identidade hotu.

Tinan 2021DNMG iha programa prinsipal mák Dezenvolve, maneja no halaó/opera Sistema vizilansia Meteorologia, klimatologia no Seismologia.

VISAUN NO MISAUN

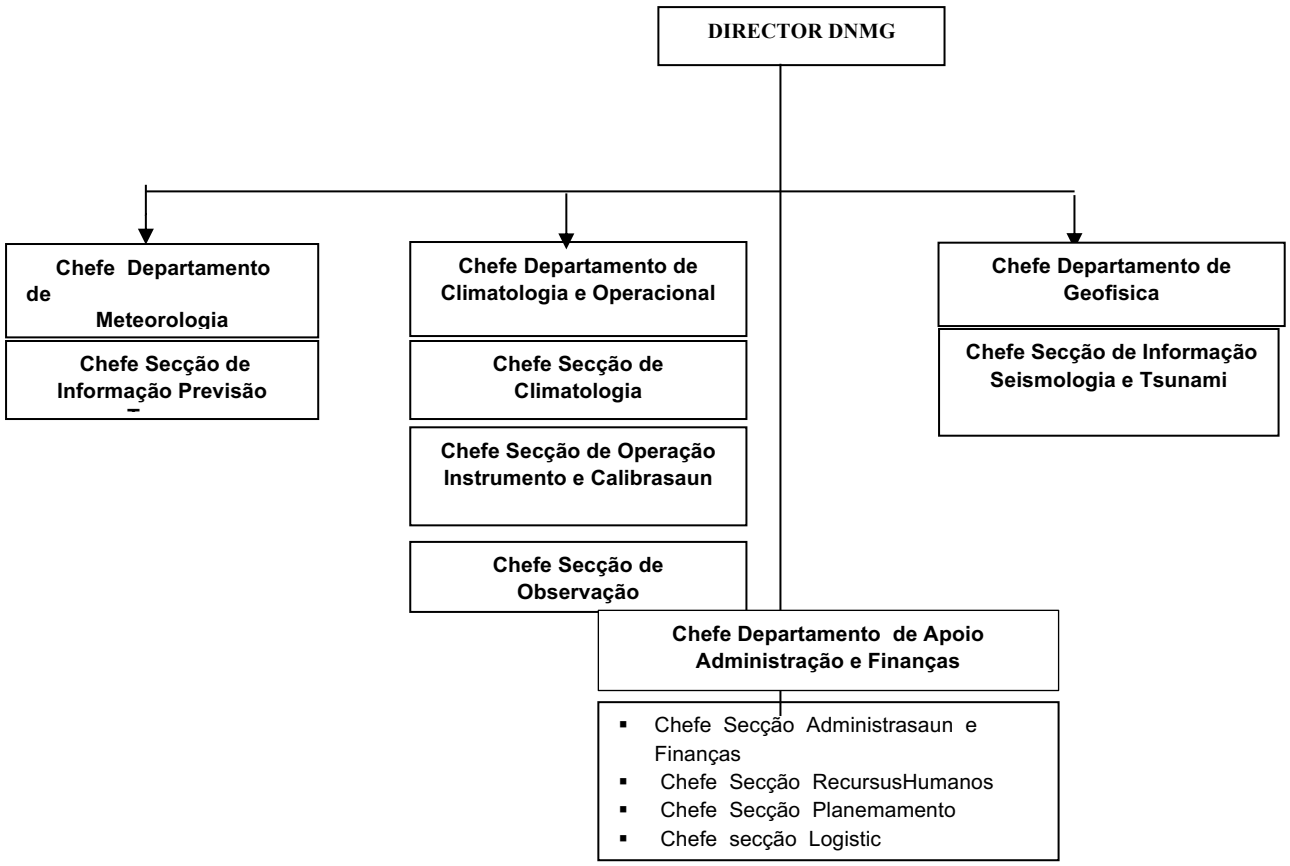
Visaun

Atu hetan konkretizasaun husi DNMG nebé mák conviável, responsiva no kredibel atu apoia siguransa publica no suksesu desenvolmentu nasional no mós partisipa ativamente iha nivel Internasional.

Misaun

1. Analiza no hatene kona-ba fenomeno Meteorologia no Geofisica nian
2. Prepara dadus kona ba Meteorologia no geofisica nian nebe mák efesiente , efektivu no seguru
3. Halaó no banati-tuir obrigasaun Internasional iha seitor Meteorologia no Geofisica
4. Halaó koodenasaun no fasilita atividade iha seitor Meteorologia no Geofisi

ESTRUTURA ORGANIZASAUN



DNMG iha Departemntu hát (4) no Seksaun Sia (9).

Departementu:

1. Departementu Meteorologia
2. Deapartementu Klimatologia no Operasional
3. Deapartementu Geofísica
4. Departementu Apoia Administrasaun no Finansas

Seksaun:

1. Previsaun Tempu
2. Observador
3. Climatologia
4. Operação Intrumento e Calibração
5. Informação Seimologia e Tsunami
6. Administração e Finanças
7. Planeamento

8. Recursus Humanus
9. Logistica

Kargu Chefia ba Chefe departemntu tolu (3) mák egiste hanesan Chefe Departementu Meteorologia, Departementu Geofisica no Departementu Operasional. Nomos Chefe Seksaun hat (4) mak egiste hanesan Chefe seksaun Observador, Planeamentu, Rekursus Humanus no Logistika,.

Director Nasional alende responsabiliza ba asegura funsionamentu DNMG hó efetivu no efikas no implementa desizaun husi Superior (Ministro, Diertor Geral no Inpektor Geral) no koordena servico ho Chefe Departemntu sira haló mós kaduka funsaiun ba servico Adminstrasaun no finansas tamba seidauk hetan nomeasaun ba chefe departementu Apoia Administrasaun no Finansas. Chefe Departementu Meteorologia haló mós kaduka funsaun ba servico apoia Departementu Geofisika nian no Chefe Departementu Operasional haló mós kaduka funsaun ba apoia servico ba Departementu Klimatologia.

DNMG iha total funcionarios hamotuk nain 37 pesoas kompostus permanente 17 pesoas (DNMG original 14 pesoas no destakadu nain 3 pesoas). No funcionario kazuais nain 20 pesoas.

Knar responsabilidade

1. Chefe Departementu Meteorologia

Chefe Departementu Meteorologia responsabildade ba Previsaun tempu diaria ba publico, aeronotica no maritima, eventu extremu hidrometrologia, data satellite no modelu nomos observasaun Meteorologia iha Municipio sira.

2. Chefe Departementu Klimatologia no Operasional

Chefe Departemntu Klimatologia no operasional responsabilidade ba operasaun Aero, servico klimatologia no manutensaun no kalibrasaun instrumentu observasaun Meteorologia, Instruementu Seismo no servico IT.

3. Chefe Departementu Geofisica

Chefe departementu Geofisica responsabilidade ba informasaun rai nakdoko no tsunami area Timor laran no aredores Timor. No koordena servico ho IPG, NDOC/protesaun sivil.

4. Chefe Departementu Apoia Administrasaun no Finansas

Chefe Departementu Apoia Administrasaun no Finansas responsabilidade ba admistrasaun, finansas, planeamentu no logistic dirasaun nian.

Program no Atividade

1. **Orsamentu 2021**

Iha tinan 2021 DNMG hetan alokasaun orsamentu Geral do Estadu (OGE) hamotuk USD 515,804.00. Alokasaun Orsamentu refere kompostu husi kategoria tolu (3) hanesan *Salarios* hó montante USD 66,204.00 no *Bens e Servicos* hó montante USD 427,396.00 no Capital Minor hó montante USD 125.00.

Hó orsamentu refere DNMG konsege ezekuta hó montante 342,977.02 (74%) no Balanco (saldo fila hikas ba kofre estadu) mák USD 119,438.98 (25,83%). Hare tabela tuir mai ne'e;

Nu	Kategoria	Dotasaun original	Despeza	Persentajen ezekusaun	Balanco
1	Salarios	66,204.00	59,035.36	89,17%	7168.64
2	Bens Servicos	427,396.00	283,941.66	66.442%	112,194.84
3	Capital Minor	125,000.00	107,658.98	86,13%	17,341.02
Total		515,804.00	342,977.02	74%	119,438.98

2. **Implementasaun atividade no resultadu**

Nu	**Programa**	**Atividade**
1	Jestaun Operasional Meteorologia e Geofisica	Desenvolve, halaó no opera Sistema vijilansia Meteorologia, klimatolagia no seimologia
2		Administrasaun Geral

- **Proseso deseminasaun informasaun ba público nebe DNMG halo:**

Kanal	**Loron**	**Semana**	**Meses**	**Anual**	**descrisaun**
RTTL (Programa Kafe Dader) (youtube live streaming)	1	5 dias (la inclui sabádo ho domingo) maibe	20	240	Haló durante tinan 4 hobalun (tuir agreement nebe DNMG ho RTTL establese)

		previsaun sabádo-domingo fo sai antes iha sesta)			
Radio komunidades 13 municipio	1	5	20	240	Agora dadaun informasaun labele pasa liu husi mobile tamba saldo laiha
Ponto Focal Disaster iha 13 municipio	1	7	21	252	Mensagem liu husi Mobile sei parado tamba saldo laiha
Facebook (DNMG Timor-Leste)	2	5	20	240	Post mensagem dader oras tuku 9/10, loraik oras tuku 3
WhatsApp group	Loro-loron				Informasaun sei haruka ba pontu focal disastre, radio comunidades, Centro nasional operasaun disastre, protesaun civil, bombeiros, no parseiro sira nebe iha ligasaun ho disaster, no utiliza media WA
BlogSpot DNMG (meteologiatl.blogspot.com)	1	7	21	252	BlogSpot entry kada lokoraik.
Iha Previsaun ne'e uza models no imagen Satelite husi Himawari-8 (JMA). Models sira ita uza liu husi website mák; ECMWF, GFS, ACESS, Himawari8, Sadewa no web page no tools mák oferese gratuitu husi BMKG Indonesia (https://signature.bmkg.go.id/) no hetan mos suporta husi RIMES liu husi previsaun loron 3 nian manda tuir email no oferese web page gratuitu http://www.rimes.int/?q=wrf_nwp no WMOmos suporta gratuitu (https://www.ecmwf.int/en/forecasts/charts/web/classical_meteogram_wmo?facets=undefined&time=2020012900,0,2020012900&epsgram=classical_10d&meteogram_location=London_United_Kingdom)					

- **INFORMASAUN RAI NAKDOKO**

Koperasaun / Agencia	Data	descrisaun
RIMES	Informasaun simu depende rai nakdoko acontece	Hetan bulletin rai nakoko liu husi sms,no email
IPG	Informasaun simu depende rai nakdoko acontece	DNMG iha agreement ho IPG relasiona ho diseminasaun informasaun wainhira akontese rai nakdoko ho skala 4.5 ba leten informasaun sei haruka direita mai DNMG atu bele publika
NDOC	Informasaun simu depende ba rai nakdoko akontese	Simu bulletin tekniko, no sumario akontese rai nakdoko kada 3 meses, 6 meses no tinan ida
Update informasaun rai nakdoko no Tsunami. Durante ne'e seidauk akontese rai nakdoko iha ita nia teritorio maibe ita sente tanba akontese iha besik ita nia teritorio.		

3. **Adisional Atividades Operasional Diaria**

- Fó alerta sedu ba público kona ba tempu extremu (extreme weather) hanesan udan makas/forte, anin bót, laloran as, no tsunami. No Realiza sorumotu ho parseiro sira/*stockholder* hodi informa situasaun klima aktual.
  Exemplu: 1). iha inisio fulan Agustu 2020 Alerta ona kona ba Fenomena LA NINA mák sei akontese hahu husi fulan Otobro 2020 ate Marco 2021. DNMG komunika ho protesaun civil no agensia nasional no internasional sira atu preparadu hasoru fenomena LA Nina ne'e. DNMG mos públika buletim tecnico hodi pasa kanal RTTL, Radio komunidade, FB, WA no Media news sira, no fokal point iha munisipio sira.
- Produs bulletin Klima mensal no distribui ba parseiros sira kada fulan
- Halaó observasaun meteorologia iha Aeroporto Dili, Baucau no Oecusse tuir orario hodi fornese Relatorio Meteo (*Meteo Report*) ba Tore Control kada oras iha tempu normal (1/2 oras kuandu *exteram weather*) hodi informa ba piloto kona ba informasaun tempu no klima. Meteo report mák hanesan; *Visibility, Cloud base, temperature dew point, Win Speed & direction, Air Pressure*, *present weather* (*Rainfall, thunderstorm, Temperature Max & Min, and*

Relative Humidity). Iha mos *suplimentary reaquest* kuando iha tempu udan mák hanesan *Thunderstorm, Cumulonimbus (CB) direction, rain direction*, (Exemplu Meteo report hare iha anexo).

Funcinario Observador Servico 14 horas kada loron no 7 dias kada semana, inkluindo loron feriado. Hahu husi 6 horas dader tó 6 horas lokraik.

- Enter data Observasaun Meteorologia no Klimatologia ba sistema data base "CLIDE". Data base CLIDE ne'e asegura iha IT Center (DNIC) no Back up lokaliza iha Estasaun Comoro (offline). Data nebe mák hatama haneasan *Rainfall, Temperature Max & Min, Win Speed & direction, Relative Humidity, Evaporation*. Dadus sira ne'e hahu kedas iha portuges nia tempu to adata. Dadus sira ne'e koilheta alende husi estasaun DNMG rasik mais barak liu mai husi Agro Meteorologia (ALGIS), Ministerio Agrikultura, no balun mai husi Gestaun Agua/hidrologia Ministerio Obras Pública. Alende ne'e atende mos pedido husi Governo, Privado, Universitaria, NGO's no Identidade balun hodi fornese dadus observasaun meteorologia hó gartuitu. (Identidade sira ne'e mák durante ne'e mai foti dadus, bele hare iha lista anexo).
- Halo mos Klimatologia ba data Observasaun Meteorologia nebé produs iha hardcopy no softcopy (excel), parameter nebe mák hatama *Rainfall, Temperature Max & Min, Win Speed & direction, Relative Humidity, Evaporation*, *Cloud, Air Pressure, solar radiation.* Dadus ne'e mai husi estasaun Dili, Baucau no Oecusse (data la sufisiente)
- Atendementu publico ba fornesementu data klimatologia ba edentidade nebé mák persiza.
- Servico linha ministerial ho Protesaun Civil-ESTATAL hodi atualiza informasaun tempu no klima hodi responde fenomena La Nina
- Iha 06 de Julho 2020 iha Cerimonia intrega ekipamentus informatika nudar doasaun USAID no implementa husi IOM ba Centro previsaun no monotorizasaun tempu no klima ba Dirasaun Nasiona Meteorologia e Geofisica iha fulan Maio 2020 durante Estadu de Emergensia. Partisipa iha Cerimonia ne'e Sua exlencia Ministro Transportes e Komunikasaun, Sr. Jose Agustinho da Silva hó estrurura MTC, SE Embaisador Estadus Unidas, Sra. Kathleen M. Fitzpatrick, Excelencia Country Mission International Organization Migration, Sr. Wonosai Wokington Sitole. No konvidaus husi parceiros sira seluk.

- Hamutuk hó National Designated Authority (NDA), hodi atualiza informasaun **Concep Note** ba projecto Early Warning System/Sistema Alerta Sedu (EWS) nebe fundus sei mai husi **Green Climate Fund** (GCF) no hetan suporta husi **Organizasaun Meteorologia Mundial/Word Meteorology Organisation (OMM/WMO)** no sei impementa husi **UNEP**. Projekto ne'e aprova ona husi Board iha fulan Outobru 2020 maibe sei hadia buat balun no hatama hikas fali ona hein resultadu iha fulan Março 2021.
- Halo talk show iha programa Telejornal Kalan iha 7 minutus, Sala redasaun, no Programa kafé dader iha RTTL no Dader Kmanek iha GMN TV kona ba situasaun Klima no impaktu ba Timor Leste.

4. Conferensia no Trainamentu via virtual/online.

No	Naran	Sujeito/Subject	Orario	Host
1	Terencio Fernandes Moniz	12th Meeting of RIMES Council	25-26 Novembro 2021,oras Bangkok UTC+7	- RIMES Bangkok
2	Anita da Silva Ferreira	Impact base Forecast (Meteo Public)	07-09 Desembru 2020, oras Jakarta UTC 00-03	BMKG Indonesia
3	Angelina Freitas	Impact base Forecast (Meteo Public)	07-09 Desembru 2020, oras Jakarta UTC 00-03	BMKG Indonesia
4	Joviano Fonseca	Impact base Forecast (Meteo Public)	07-09 Desembru 2020, oras Jakarta UTC 00-03	BMKG Indonesia
5	Osorio Anuno	Impact base Forecast (Meteo Public)	07-09 Desembru 2020, oras Jakarta UTC 00-03	BMKG Indonesia
6	Simão Telles	Impact base Forecast (Meteo Public)	07-09 Desembru 2020, oras Jakarta UTC 00-03	BMKG Indonesia
7	Carla Maria Freitas	Kursu Ingles nivel 2	Hahu 17 de novembro 2020 ate fualan nen (6)	SEA no UNDP
8	Jasinta Soares da Conceição	Kursu Ingles nivel 2	Hahu 17 de novembro 2020 ate fualan nen (6)	SEA no UNDP

9	Albeni Monteiro	Kursu Ingles nivel 1	Hahu 17 de novembro 2020 ate fualan nen (6)	SEA no UNDP
10	Anita Fereira da Silva	Kursu Ingles nivel 1	Hahu 17 de novembro 2020 ate fualan nen (6)	SEA no UNDP

Obstaklu

1. Equipamentus/Instrumentus Observasaun Meteorologia limitadu(La sufisiente)
2. Estasaun Observasaun Meteorologia Oecusse abandonado
3. Estasaun Observasaun Meteorologia Suai seidauk iha equipamentu
4. Sistema previsaun tempu sei uza deit parseiru sira nia Modelu no tools
5. Fasilidade iha studio menus hodi suporta apresentasaun iha previsaun tempu nebe la hatudu imagem iha layar nebe boot nebe foka direta hus Kameramen RTLL
6. Saldo telefoni la sufisente hodi manda mensajen liu SMS no WA ba Radio Komunidade no Fokal point sira iha Municipio hotu.
7. Komputador la sufiseinte no kapasidade kiík
8. Internet kapasidade la toó atu downscale data satellite no loke imagen husi *models* no *tools* previsaun nian.

Rekomendasaun

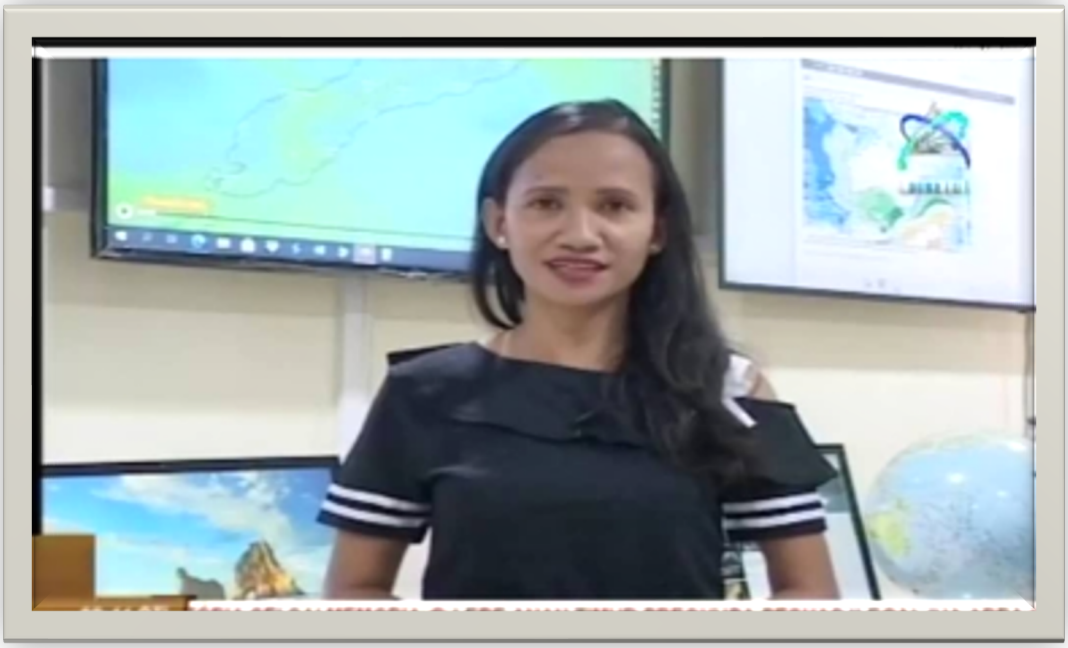
1. Kria/establese Edifisio/Office permanente mesak hanesan quartel ba Meteorologia e Geofisica nune'e hodi bele aktividade necesidade DNMG nian nebe periza spasu luan.
2. Establese Sistema Meteorologia e Seismologia, hodi bele fornesa rasik informasaun ba públiku tuir kondisaun tempu no klima iha Timor Leste liu husi equipamentu no modelu rasik.
3. Persiza urgentimente atu haló ektensaun MOU hó BMKG nebé ekspirar/mate tia ona no haló mós akordo implementasaun tekniko hó Badan Meteorologi, Klimatologi dan Geofisika Indonesia (BMKG) hodi implementa MOU nebé atu ektende tan ne'e.
4. Aumenta funsionario professional hodi koloka iha departementu especialide no ba municipio sira hotu no aeroporto regional sira seluk no Portuaria sira iha Timor laran tomak. No maintain funsionario kazuais sira nebe hetan kontrato antes ne'e no hasáe sira nia nivel tuir sira nia especialidade..
5. Prepara studus ba fatin establesementu equipamentu ba Oceano nebe mák sei monta iha portuario sira iha Timor Leste hodi bele monitoriza laloran tasi no Tsunami.

6. Persiza koloka orsamentu ba telefoni prepago hodi bele manda informasun tempu ba Radio komunidade no fokal point iha Municipio sira hotu.
7. Persiza linha internet propio hó kapasidade as hó ba Centru previsaun tempu DNMG hodi garante informasaun nebé mák lais, kualidade no akurado mais umenus 8 mbps.

Lensa DNMG

Centru Previsau tempu no klima.

Reportasen previsaun tempu iha prorama kafe dader RTTL dader-daer husi segunda to'o Sesta.




KafeDader
REZEITA ATU JOGADORES PREMIER LEAGUE SIMU ULUK VASINASAUN

Imagem Doc. Hetan visita no apresiasaun husi PPN.Sr Aniceto iha Expozisaun 28 Novembro 2021

Imagem Doc. Sosializasaun Informasaun Tempo Clima iha Munisipio Aileu, Suporta husi World Vision Timor-Leste

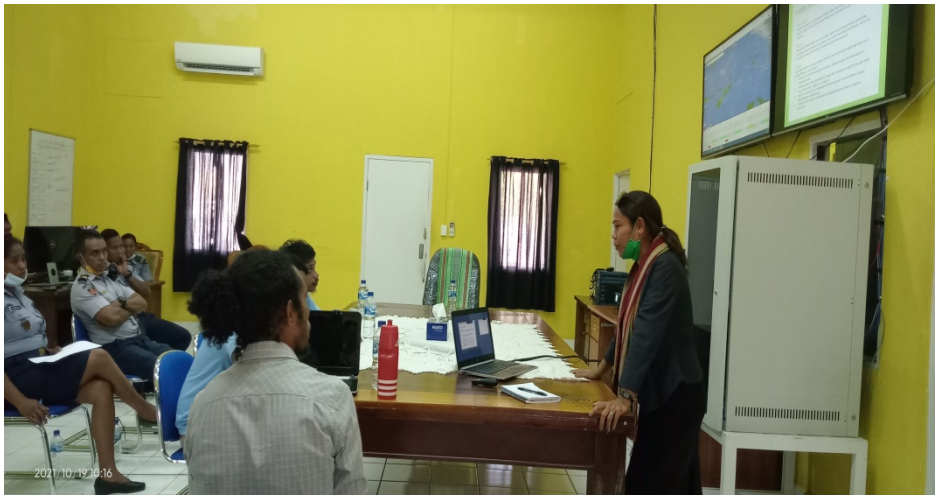


Imagem Doc. Sosializasaun Informasaun Tempo no Clima ba Comando Maritima, Hera.

Imagem Doc. Sosializasaun Informasaun Tempo Clima iha Munisipio Bobonaro, Suporta husi World Vision Timor-Leste

Imagem Doc. Diskusaun Desemvolve website DNMG, suporta husi UNESCO.
Imagem Doc. Treinamento Impact Based Forecast, suporta husi UNESCO

Imagem Doc. Atividade previzaun tempu cada dia iha RTTL

Imagem Doc. Meteorologista Partisipa iha programa Dader Kmanek GMN TV

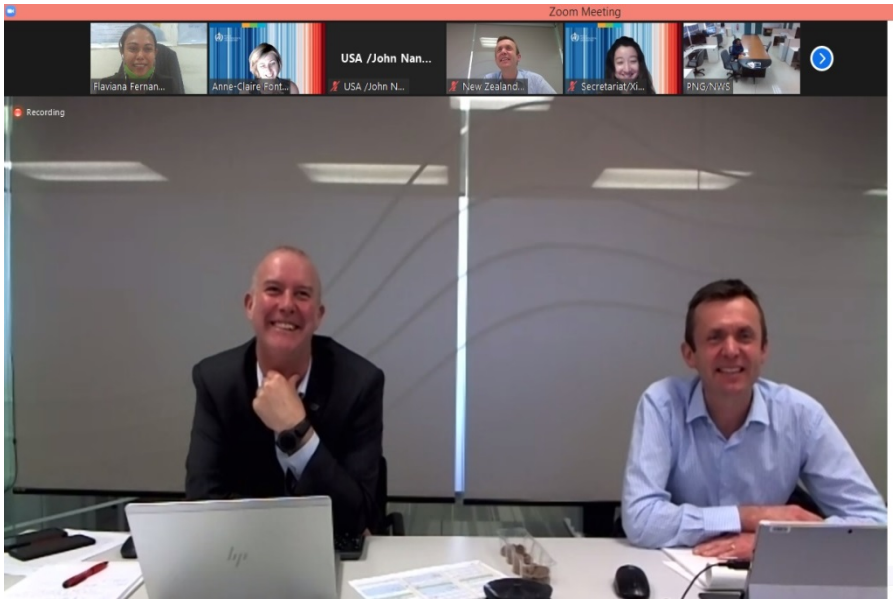


Imagem Doc. DNMG apresenta relatorio Siklone Tropical ba Organizasaun Meteorologia Mundial no DNMG partisipa iha Atividade Wibinar ho IPG

Preoridade

Kurtu Prazu:

1. Liu husi World Meteorology Organization (WMO), DNMG hetan fundus husi Green Climate Fund (GCF) hodi establesa Sistema linha/rede Observasaun Meteorologia iha Municipio sira hotu.Equipamentu sira ne'e hanesan Automatic Weather Station (AWS), Automatic Weather Observation System (AWOS), Doppler Radar, Buoy. Fundus husi GCF nebé Aloka ba Timot-Leste ho total 21.7 Milions fahe ba linha ministerial sira nebé iha relasaun hó Alterasaun Climatica. DNMG rasik sei hetan fundus hó montante 12.7 Milions. United Nation Environment Programm (UNEP) mák

sai hanesan Accreditation Entity hodi halo jestaun ba fornesementu orsamentu ba linha Ministerial inkluido DNMG.
Projecto ne'e sei halao iha fulan Julho Tinan 2022. Durasaun projecto ne'e tinan 5 nia laran.

2. Establese Sistema Previsaun Tempu modernu liu husi orsamentu Estadu Fundus Infrastrutura. Orsamentu ne'e pasa tia ona iha Cafi ho montante 2.9 Milions. Sistema ne'e hodi uza rasik modelu previsaun tempu Timor-Leste nian hodi fasilita informasaun tempu ba público hó autulizadu, lais no responsabilidade. Hodi nune bele eveita desastre naturais.
3. Establese Centru Monitorizasaun Rai Nakdoko no Tsunami, prosesu sei buka hela fundus.
4. Kada tinan tinan DNMG tenque prepara planu orsamentu ba Manutensaun no Kalibrasaun ba equipamentu Meteorologia nian.
5. Investe iha Rekursus Humanus hodi prense servisu DNMG nebé barak.
6. Hatama Reseitas ba Kofre Estadu liu husi fornesementu Dadus Observasaun Meteorologia ba instituasaun, oranizasaun no privadu. Fornesementu previsaun tempu ba Aeronotica, no Maritima, Kalibrasaun equipamentus observasaun Meteorologia husi instituasaun seluk.
7. Deside Permanent Representative (PR) Timor-Leste ba WMO

Longo Prazu

1. Hari Diresaun Geral ba Meteorologia e Geofísica
2. Hari Quartel Geral ba Dirasaun Geral Meteorologia e Geofísica
3. Hari Estudio Radio ba kanalizaun informasaun tempu ba público