
PERFORMANCE REVIEW REPORT

Department of Meteorology – Sri Lanka

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National Science & Technology Commission

Review Team

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EXECUTIVE SUMMARY

The Department of Meteorology was established in 1948 as a government department with the main objective of providing meteorological and climatological services to the general public and user communities. With time, as the demand for meteorological services and information grew, the services provided by the department were enhanced and at present the Department of Meteorology functions under the Ministry of Disaster Management as the national authority for the provision of meteorological and climatological services and early warning services with regard to meteorological hazards and tsunami. Until the tsunami occurred in 2004, the public did not pay much attention to natural disasters. Since then however, there has been increased attention paid to disaster mitigation and early warning.

The Department of Meteorology has S&T staff belongs to the Sri Lanka Scientific Service. Most of the S&T staff have postgraduate training in meteorology or related discipline. The Department of Meteorology maintains active links with international and regional agencies. Through these links they have access to regional data and satellite meteorological technology. In addition, several Governments and International Agencies have provided equipment and necessary technological know-how to initiate development projects related to meteorology. Despite the above strengths, the review team found that the Department of Meteorology is not performing up to its potential due to drawbacks in several areas.

Motivation, teamwork, conflict resolution, organizational structure, work ethics, research & development, creativity, and innovation are some of the major factors which determine the ability of any institute to perform effectively in increasingly demanding and rapidly-changing environments. The management structure of the institute must be geared to handle such issues in an organized and effective manner in order to achieve the planned objectives. The Department of Meteorology faces a number of management issues in this regard. The Department does not have a strategic development plan, and the views of the relevant employees in different disciplines and levels are not sought before the annual plan is drawn up. The roles and functions of the various divisions are not aligned with the current demands. There is a lack of prioritizing the existing resources for vital functions. There are no plans to align benefits obtained from foreign training. Progress monitoring and evaluation is weak. There is also no proper mechanism to incorporate stakeholders' requirements in planning.

At present, the department does not have the technical capacity for quantitative weather forecasts. This weakness has also been identified in an earlier study carried out by the UNDAC mission [1]. The installation of an S-band Doppler radar is expected to improve this situation. Although they have 38 Automatic Weather Stations (AWS), the reliability of the data is questionable and very little effort has been made to solve the existing problems. They do not have sufficient technical capacity to operate numerical weather forecasting models to issue early warnings.

Although there are international links and infrastructure support from the Government and several foreign Agencies, the research output of the department has continued to be poor. There is no research culture in the Department to facilitate such activities nor are there indications of collaborative research being done with other institutes. In fact, their

duties are limited mostly to routine work. The much needed analytical skills essential to identify and forecast tropical storms, drought conditions etc by analyzing existing data resources can be acquired only through research. Although resources and collaborative assistance could be drawn from local Universities and other relevant organizations to enhance research capacities, so far no such initiatives have been made.

Human resource development plays an important role in the advancement of an Institute. Being a department which practices a discipline in science, the quality of the output of the Department of Meteorology will depend solely on the research and innovative capability of the scientific and technological personnel attached to it. Although it is the responsibility of the relevant authorities in the Department to organize/provide the required training to their S&T personnel, no strategies have been formulated to fulfill this need.

A number of recommendations to overcome these issues are proposed in section 6 of the review report.

CONTENTS

Review Team	i
Executive Summary	ii
Contents	iv
PART I	
1. Introduction	1
2. Procedure adopted for performance review	3
3. Management assessment	4
4. Output assessment	11
5. Contribution to national development	13
6. Recommendations	14
PART II	
7. Management and S&T output assessment	18
ANNEXES	28
A Site visit program	
B List of officers met during site visit	
C References	

1. INTRODUCTION

1.1 History

Systematic weather observation in Sri Lanka (then, Ceylon) commenced in 1867 in a small unit under the administration of the Survey Department. This small unit which was later upgraded under the command of an Assistant Survey Superintendent and named the “Colombo Observatory” in 1907, was located at the present location of the Department of Meteorology. At that time weather observations were limited to only surface level measurements. However, by the year 1922, measurement of wind velocity at different levels of the lower atmosphere by balloon observation techniques was carried out. After World War II, the need and demand for meteorological services grew rapidly particularly in the naval and aviation sectors. This led to the establishment of the Department of Meteorology in 1948. The department became a member of the World Meteorological Organization (WMO) in 1952 to facilitate an appropriate framework for international cooperation in Meteorology and related fields. After passing through several milestones in its voyage over six decades under several ministries and technical leaderships, the Department of Meteorology, Sri Lanka now functions under the Ministry of Disaster Management with over 180 technically qualified personnel in the field of meteorology and allied fields under the leadership of the Director General of Meteorology. At present, the observation network of the Department of Meteorology consists of 22 manually observing stations including four upper air observation stations and one radiosonde, 38 Automated Weather Stations (AWS) out of which 15 operate in collaboration with other related government agencies, 40 agro-meteorological stations, 20 telemeter rain gauges and about 400 volunteer observing rain gauges.

1.2 Recent developments

After becoming a member of the World Meteorological Organization in 1952, the Department of Meteorology of Sri Lanka expanded rapidly in its activities such as weather observation, forecasting and linking with other regional and international agencies related to meteorology. In 1973, the department made its first international link by establishing a Telecommunication link between Colombo and Delhi for data transmission. The installation of a cyclone detection weather radar system at Trincomalee in 1982 greatly enhanced the capacity of the department to forecast the rainfall and path of tropical cyclones approaching Sri Lanka. The establishment of the CLICOM computer system in 1986 is also a landmark in the history of the department. This enabled the storing of recorded weather parameters in digital form. In 1998, the department entered into modern satellite meteorological technology with the installation of a High Resolution Satellite Imagery Ground Station. After the disastrous Tsunami on 26th December, 2004, the department also took the role of the National Tsunami Warning Center. Upgrading the Delhi-Colombo telecommunication link to a satellite based link in 2007 facilitated a fast data transferring mechanism in the global meteorological data network. In 2009, the observation network of the department made a historical achievement with the establishment of 38 Automated Weather Stations (AWS) under the financial assistance from the Japanese government. Recently (2008) the department took initiatives to install the country’s first Doppler Weather Radar at

Gongala peak in Deniyaya at a cost of Rs. 400 Million which is yet to be commissioned [2].

1.3 Other related institutions

The Department of Meteorology has established close links with a number of related institutions in the region for capacity building and data sharing. It has had a historical link with the India Meteorological Department (IMD) from the early 70's. In year 2009, the India Meteorological Department helped Sri Lanka to replace its Global Telecommunication System (GTS) with a new technology known as the Digital Meteorological Data Dissemination (DMDD). The Department of Meteorology has also established a close link with the Japanese Meteorological Agency (JMA) for capacity building in seasonal weather prediction and the automation of the observation network. Recently it linked up with the Korean Meteorological Agency (KMA) to obtain real time satellite weather information in the vicinity of Sri Lanka. It also associates with the United Kingdom Meteorological Office (UKMO) to receive aviation meteorological information and the European Organization for Exploitation Meteorological Satellites to obtain real time images from a EUMETSAT weather satellite. With respect to Tsunami warning in Sri Lanka, the Department of Meteorology has established close links with India, Indonesia and Australia under the Indian Ocean Tsunami Warning Systems (IOTWS) and the Japanese Meteorological Agency (JMA).

2. PROCEDURE ADOPTED FOR PERFORMANCE REVIEW

The Science & Development Act No. 11 of 1994 mandates the National Science and Technology Commission (NASTEC) to review the progress of S&T institutions in relation to objectives set out in Section 2 of the Act. The NASTEC in consultation with the institution to be reviewed decides on a review team as well as a schedule for the review. The team is guided by the directions given in the guidelines prepared by NASTEC for the performance review of S&T Institutions [3].

The Department of Meteorology invited NASTEC to review the institution in August 2011. NASTEC in consultation with the Department of Meteorology entrusted the review task to a team of 4 members selected based on their expertise. The self assessment report of the Department of Meteorology was made available to NASTEC in March 2012.

NASTEC met the review team and a representative of the Department of Meteorology in April 2012 and identified lines of inquiry as well as further information and documentation necessary for the review. The team also identified individuals as well as groups they wished to meet during the site visit and agreed with the Director General (DG) on dates and a time table for the review (see Annex B).

The site visit was carried out during 10-11 May 2012. The initial meeting of the review team with the DG and the board of directors was held to brief them regarding the objectives of the review, clarify why and for whom the evaluation is being done, describe the benefits to the institution and cultivate support for the evaluation. This was followed up by a detailed presentation by the DG of the institution based on the submitted self assessment report.

The review panel held discussions with members of different categories of staff (Directors, scientific service and engineering service staff, meteorological observers, communication officers, technicians, union representatives, finance and administrative staff, research assistants and other grades). The review team also visited a number of divisions in the department (National Meteorological Centre, computer division, rainfall division, climate division, data division, electronics division, agro-meteorology division, etc) and discussed pertaining issues with the relevant officers (see Annex C).

A separate set of meetings were held on 18 May 2012 during visits to the Meteorological office at the Katunayake airport and the observatory (Met farm). The final meeting was held on 25 May 2012 with the current stake holders (Army, Navy, Air force, Agriculture, Mahaweli, Irrigation, Plantation, Health, Airport & Aviation, DMC, NBRO, etc) and representatives of the met department. After the review meetings, the panel met on several occasions to discuss the findings to draft the review report.

The report is structured as two documents; the present document, which constitutes the main part of the report (Part I) and a second document (Part II), prepared in the form of a set of tables, which provides management and output assessments.

3. MANAGEMENT ASSESSMENT

In this section, the ability of the Department of Meteorology to produce useful and relevant outputs is accessed based on internal policies, strategies, management practices and the ways in which these are applied. By evaluating these critical aspects, one can identify factors that enhance or hamper the performance of the Department of Meteorology. The assessment is based on the guidelines for performance review provided by NASTEC [3]. The relevant management practices followed by the Department of Meteorology are summarized below.

3.1 Response to external and internal environment in planning

Recently the Government has setup a Disaster Management Center to provide early warnings, help the victims, and take preventive measures pertaining to natural and other forms of disasters. In this context the general public and the Government expect the Department of Meteorology to issue accurate early warnings so that they can respond to them on time and take preventive measures. Furthermore, with the increase of the opportunities and social needs of the general public accurate weather predictions too are becoming an important factor in planning out various day to day activities.

As mentioned in several sections of this report The Meteorology Department has not taken any step in their planning to train personnel with required expertise to analyze current scientific data and provide accurate warnings.

The external environment of the Department of Meteorology is vibrant due to frequent changes in stakeholder conditions and needs. Thus, it is important for the Department of Meteorology to periodically review and adjust its directions and goals, to meet these changes. The review team is of the view that the Department of Meteorology has not taken adequate steps to identify their strengths, weaknesses, opportunities and threats (SWOT) properly and formulate a strategic plan to change the organizational structure and management strategies to cater to their stakeholder needs.

The Department of Meteorology has clear development goals which are primarily directed towards forecasting weather to the nation and other stake holders abroad. However, forecasts they normally produce on extreme weather conditions, floods, lightning, heavy rainfall, etc. are neither strategic nor specific, but more general and academic in nature. Due to this, they are unable to alert various economically important sectors such as Agriculture, Plantations, Industries, Fisheries and Irrigation on impending sudden heavy rain falls and stormy conditions or droughts. Of course this is partly due to the lack of proper equipment to carry out quantitative weather forecasts. The new equipment under installation such as the S-band Doppler radar is expected to improve this situation.

3.2 Planning S&T / R&D programs and setting priorities

A program is an organized set of research projects, activities or experiments that are oriented towards the attainment of specific objectives. Program objectives should be

consistent with organizational strategies and should reflect user needs and development goals.

According to the Self Evaluation Report [2] provided by the Department of Meteorology, the objectives of the department are,

- To observe and collate weather elements in conformity with the World Meteorological Organization (WMO) standards, and maintenance of climatological databases.
- To provide weather and climatological services as the national authority.
- To issue early warnings and advisories on weather related hazards and tsunami.
- To provide meteorological services to national and international aviation in accordance with the technical regulations stipulated by World Meteorological Organization (WMO) and International Civil Aviation Organization (ICAO).
- To encourage study and research in meteorology, climatology, climate change and allied subjects, and to organize and contribute to public awareness programmes in these thematic areas.
- To provide limited astronomical and terrestrial magnetism related services.

Although the objectives are defined there are no goals to be achieved under each objective, or strategies and the development projects planned by the department to achieve such objectives. The Review team has seen this as a major drawback in the planning of various activities by the department.

In the case of planning and setting priorities, the review team observed that only the Board of Directors is involved. There is no evidence of previous research findings and information being used in planning of new projects. Though there is a research division they do not take part in the planning process. Other important divisions of the department such as the Electronics, Administration, Finance, Planning and Maintenance sections are also left out of the planning process. Similarly, stake holders are not consulted, nor are their views taken, when plans are prepared. It is clear from the discussions that the roles and responsibilities of the officers are not considered when the overall plan is prepared. Therefore we believe that the current management practices should be changed, and standard practice of drawing up of plans by setting objectives, goals, strategies and activities to achieve goals together with appropriate Performance Indicators (PIs) should be adopted to improve planning and the initiation of new programs.

Fortunately, the Department of Meteorology is linked to the World Meteorological Organization (WMO). This has facilitated the use of satellite images and the receiving of the metrological data of the entire region. Many of the programs beneficial to the department have been initiated by foreign counterparts. This has helped the department to compensate for the lack of in-house planning and to initiate new programs. However, Reviewers believe that the full benefits of such foreign and Government funded projects cannot be utilized effectively to uplift the standard of the department unless they become a part and parcel of a carefully drawn development plan. Furthermore, Review team has not seen any planned R&D effort to develop appropriate local technologies wherever possible to replace expensive imported technologies.

The review team noticed that collaborations with local agencies in planning programs are almost in non-existence. Outside agencies such as the Department of Agriculture has been supplying rainfall and temperature data free of charge for many decades. In development point of view these data are of no use unless they are properly analyzed and necessary conclusions drawn on the behavior of weather and climate patterns. So far the Department of Meteorology has not initiated any collaborative research program with local Universities or research organizations to research on this valuable data without merely selling them at a cost to their stake holders.

3.3 Project management and maintenance of quality

Proper project management and quality assurance are needed to ensure effective research operations and the quality of output and achievement of the desired objectives.

The Department of Meteorology currently has no proper procedures in place for senior management staff to examine projects to ensure proper resource allocations, and determine equipment requirements and the necessary technical staff support, and finally to assure the quality of the outputs in order to achieve required outcomes. This situation may have arisen due to the lack of project planning.

The self assessment report submitted by the Department of Meteorology indicates that the staff has not carried out quality research during the last five years despite having regional collaborations, access to a vast resource of weather parameters, computer facilities with necessary tools for analysis. The lack of a research culture in the department is affecting the overall performance and quality of work.

The Department of Meteorology manages a number of outstation centers at which weather parameters are collected. Many of these data collection centers operate with traditional manual equipment. Since calibrations are not carried out regularly, the staff has no clear idea about the accuracy of the equipment. The work at the remote centers is not monitored closely to ensure data quality due to lack of transport facilities. Often rather than using standard statistical methods to ensure data quality, officers rely on their experience to detect data errors. There is a serious need to implement a mechanism to ensure the quality of the data collected at the various remote centers. This situation has to be rectified immediately with regard to the data acquisition and validation processes being performed at the Katunayake weather station which supplies weather information to the Aviation Industry.

3.4 Human Resource Management

The availability of an adequate number of qualified staff and the effective management of human resources are key determinants of organizational performance. Establishing a cadre of qualified staff takes many years. To keep pace with new developments in science, technology and management, it is also essential to upgrade staff regularly. Staff planning, selection, recruitment, evaluation and training are key components of human resources management that need to be in place for the effective performance of an institution.

At present the total staff strength of the Department of Meteorology is 293. Unfilled vacancies range from 13% to 26% between different staff categories (see Figure 1). It is important to ensure in future, that fully qualified and experienced officers are available to fill the vacancies at any given time. Every division must be adequately equipped and strengthened to support the diverse work carried out by them.

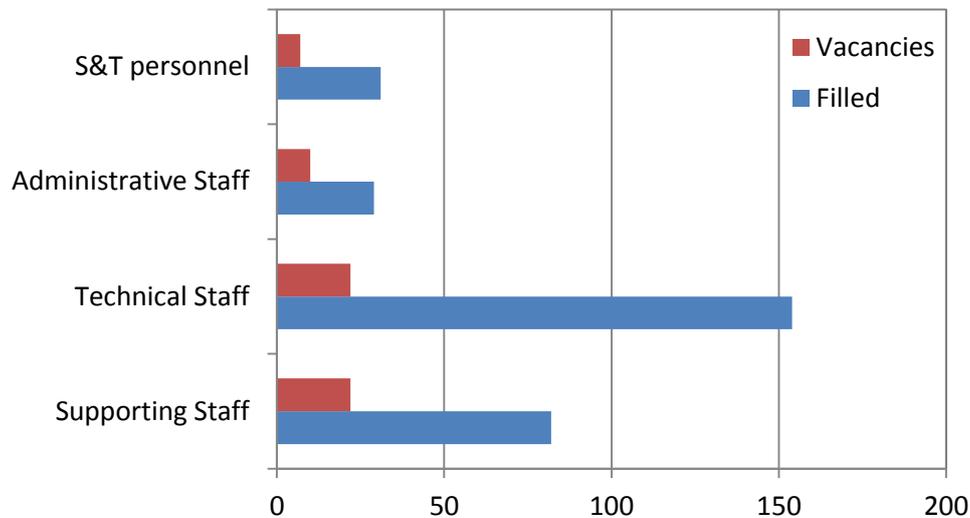


Figure 1: Staff strength of the Department of Meteorology (2011)

Approximately 50% of the S&T staff has postgraduate (M.Sc.) qualifications in meteorology or a related subject. Review team has noticed that none of the S&T personnel attached to the department does not possess a research degree such as M.Phil or Ph.D, and it is detrimental to cultivate research culture in the department, and this situation needs to be rectified. Generally, foreign training is given to S&T staff. This is limited to short-term training and workshops/seminars. The past 3 years data show that every S&T staff member has had an opportunity to obtain foreign training annually. Local training is limited to short-term training only. A majority (over 80%) of the local training is also given to S&T staff which is not a satisfactory situation. While S&T staff can participate in specific local training programs, whenever possible, opportunities must be given to the other staff categories. Although none of the S&T staff has participated in local conferences, they should be directed towards actively participating and contributing in scientific conferences.

The Department of Meteorology provides two years of training in operational meteorology to new recruits to the technological service, of which one year is on-the-job training. When new systems/technologies are introduced, the relevant staff is provided with the required training. However, no formal training programs or career development plans are available for the various grades to improve the quality. The deployment of the middle level staff must be carried out according to a well-designed plan to ensure that adequate qualified officers are available to manage key positions.

Training opportunities should be given to achieve the objectives of the department. As much as possible, all categories should be given opportunities to improve, and the officers to receive the training should be selected in a transparent manner.

Being a Department with so much of state –of-the –art equipment and data resources at hand it should be capable of providing the required research training leading to M.Phils and Ph.Ds to its own staff and even to outsiders if proper plans are drawn up. It is unfortunate that currently the use of all Government and foreign funded projects implemented by the department is just limited to acquiring of data. Instead each and every such project should be converted to a viable research project, and used to train S&T personnel.

The Department of Meteorology has not paid much attention to recruitment, working conditions and the promotional prospects of the staff. Staff appraisal is absent. This should be introduced from top to bottom. Team spirit should be built through the undertaking of research projects in order to acquire different skills. Practices should be adopted to recognize the skills and talents of the officers and suitable rewarding mechanisms should be introduced.

3.5 Management of organizational assets

Organizational assets include not only buildings, equipment, and finances, but also assets such as data, knowledge, technologies developed, intellectual property, and even credibility and reputation. A continuous effort is needed to protect all of these assets, because they are the basis for the sustainability of the institution and allow it to continue delivering quality research and service outputs.

The Department of Meteorology has 22 manually observing stations, 40 agrometeorological stations, 20 telemeter rain gauges and 38 Automatic Weather Stations (AWS). Some stations were established 75 to 100 years ago during colonial period. These stations were sufficient enough to collect weather parameters for the requirements at that time. However, the significance of these stations has now changed. There are new industries in remote areas and agricultural lands have now shifted to new areas and hence, new weather stations are required to serve in those areas. Some stations are also affected due to rapid developments in the vicinity of the stations. Managing of these assets has been somewhat neglected.

No periodical surveys are conducted to identify the short comings and attend to them during each planning cycle. The review team was informed that some of the remote stations (for example Galle) do not have the required basic equipment such as Anemometers and Barometers. No spares are maintained to replace a faulty instrument to ensure uninterrupted data collection. Many instruments need calibration to ensure their accuracy. For example, the master Barometer has not been calibrated since 1987. Plans are required to upgrade the maintenance division to ensure proper maintenance of the equipment. For example, due to poor maintenance, the upper air observation radar was out of function for some time and it has now been handed over to the Sri Lanka Navy.

Unlike manual operations, Automatic Weather Stations (AWS) are capable of providing uninterrupted continuous data for 24 hour periods. Rather than setting up new stations, AWS can be redistributed to strategic locations to cover the new requirements. However, these stations cannot be left unattended and periodic maintenance is required for optimal operation. At present data from AWS are not verified and calibrated against

standard measurements. Therefore officers tend to depend on manual measurements rather than using data from AWS. This situation should be corrected.

Procurement of equipment also needs attention. Equipment should not be purchased without a proper service contract. For example there have been cases where suppliers have not released passwords and demanded additional payments to release them even to reconfigure the equipment. In spite of these difficulties, the maintenance of equipment is carried out by the local staff to the best of their abilities and this effort should be commended.

The allocation of resources is adequate for some divisions, but not for all. For example, the Administration and Finance divisions suffer due to a lack of basic equipment such as computers and printers. The management of infrastructure is generally poor. For example, the main building which has a historic value is unattended with dangerous structural defects, and cracks being developed. Although the department has a number of stations that require periodic visits, due to a poor planning culture, the available vehicle fleet is not sufficient to attend to the basic requirements.

The review team did not come across any financial resources other than government funds to finance the plan. Although the Department of Meteorology is a service based institution, funds should be raised by providing services to private companies such as construction agencies, international and local aviation agencies, navigation agencies and other relevant stakeholders. There is a high potential to bring benefits to the department by initiating collaborative research programs centered on projects funded by foreign agencies.

3.6 Coordinating and integrating the internal functions/units/activities

If the planning and coordination of internal units and the interaction between them are neglected, it affects the overall performance of the institution. The organization of these units and the overall structure need to be reviewed from time to time to ensure their smooth and efficient operation.

There is reasonable coordination between the central office and the remote centers in gathering weather parameters in time. It is commendable that the remote centers function to their potential even with man power shortages in managing the centers. However, the internal coordination and the delegation of work need improvement. For example, while the airport office performs a critical function and is overloaded with day-to-day work, they have also been assigned to monitor tsunami alerts. Another example is, while managing a number of systems for daily forecasting and handling news agencies, tsunami warning is also added to NMC without increasing man power for proper management. On the other hand, duplication of the same work is carried out in several divisions. The rainfall division, the data division, the climate division, and the agro metrology division are examples. Some of these divisions could be amalgamated and the officers could be deployed effectively to carry out new functions.

3.7 Managing information dissemination and partnership

Two important functions of all S&T institutions are the management of technology and the dissemination of information to users. Partnerships / linking up with other related institutions including universities, industries, the private sector, international research organizations, farmers etc., promotes information exchange, collaboration and cost sharing, and ultimately improves the quality and relevance of research.

The Department of Meteorology is linked with a number of international agencies such as the World Meteorological Organization (WMO), Korea International Cooperation Agency (KOICA), Japan International Cooperation Agency (JICA), etc. Local weather observations are also transmitted to regional meteorological centers. The Department of Meteorology has also taken initiatives to form an expert group to try to minimize the effects of hazards and to support DMC to release severe weather related information. They also contribute to national development by providing meteorological and climate data, information and forecasts.

However, the outcomes of the current practices do not seem to meet the requirements of the stake holders of the Department of Meteorology. Little effort is taken to provide specific forecasts so that stake holders can either maximize their profits or minimize their losses. There is no mechanism to get feedback from the stakeholders. The review team did not see any established mechanism to review the validity and the accuracy of their own forecasts, find the reasons if anything has gone wrong and take specific remedial actions to improve the reliability of forecasts with the help of internal or external experts.

3.8 Monitoring, evaluation and reporting

Monitoring and evaluation are key management processes of public S&T institutions. Monitoring and evaluation are also important to determine whether the institution is learning from its earlier achievements and failures. Monitoring, evaluation, and reporting procedures need to be properly designed (i.e., integrated into project planning and implementation) and periodically reviewed, in order to provide useful information for decision-making and accountability.

At present there is no effective monitoring, evaluation and reporting mechanism available at the Department of Meteorology, and is also due to the lack of a strategic plan for the department.

The Department of Meteorology has the knowledge and skills to make attractive publications through print or electronic media to popularize climatology among the general public, especially the younger generation. If public interest is increased, their support will be extended to the department in many ways. Reporting could be effectively carried out through the existing web site of the department.

4. OUTPUT ASSESSMENT

When assessing the output of an institution, the expected role of that institution and capacity of the available staff should be considered. Although there are a number of areas to assess productivity, the most relevant areas for the Department of Meteorology can be outlined under three specific categories.

4.1 Technologies developed

The Department of Meteorology depends entirely on imported technologies and outside initiatives for its operational activities, and so far it has not taken any steps to develop technologies of its own to replace imported technologies. The Department has a technical section with competent personnel, but their functions are limited to the setting up and commissioning of imported equipment related to various projects, and their maintenance. The technical section is not encouraged or geared to perform any R&D type activities. However, installation and commissioning of the S-band Doppler Weather Radar project is an initiative by the Department of Meteorology. A significant improvement in short-term weather forecasting is expected once the system is in operation. Further improvements are expected through the ongoing initiative of fine tuning the WRF computer model.

4.2 Information Dissemination /Extension

One of the main tasks of the Department of Meteorology is the monitoring of climatic parameters in and around Sri Lanka. The weather data thus produced are made available to the stake holders by the Department of Meteorology in different forms. The general public receives this information in the form of weather predictions and warnings, whereas the Department of Agriculture and the Irrigation Department use the data provided by the Department of Meteorology for agricultural and irrigation purposes. Port & Aviation Authority is another major stake holder of the Department of Meteorology, and a separate weather station set up at the Katunayaka International Air port provides the necessary data. The Defense Forces, Health Ministry, and Researchers are also important stake holders of the Department of Meteorology who depend on the weather data provided by them for their activities. It also supplies weather and climate information to entities such as insurance, hydro power, and fisheries. The skills available at the Department of Meteorology for information dissemination are assessed as adequate.

Apart from the above services, the Department of Meteorology regularly conducts popularization activities and educational programs to educate the general public and school children. School children visit their data collecting centers on study tours. The projects such as Monsoon Forum and Roving Seminars for Farmers are especially designed to benefit their stakeholders.

The Department of Meteorology also shares local weather data with regional agencies through the Global Telecommunication System (GTS) of WMO. They also have implemented an alternative system (Digital Meteorological Data Dissemination - DMDD) through a grant from the India Meteorological Organization (IMO).

4.3 Research Publications

The Department of Meteorology is an institute which practices a scientific discipline. Any institute which practices science needs to be research oriented. The relevance and the effectiveness of the output from such a department will depend solely on its ability to make use of the advancement of science and technology, and produce outputs which are acceptable to and satisfy the current needs of the society. The panel of reviewers believes that the capacity of the Department of Meteorology in this respect is far from satisfactory.

The activities performed by the Department of Meteorology are currently limited to the collection of weather parameters and providing it to stake holders, and issuing general weather forecasts which very often fall below the levels of expectation of modern Sri Lankan society. Weather forecasting is a highly scientific research process which involves rigorous analysis and interpretation of a large number of weather parameters. The reviewers strongly feel that the efforts made by the Department of Meteorology in this area are far from adequate. The main reason for this situation can be attributed to the lack of a research culture among the S&T staff attached to the Department of Meteorology. Currently the Department of Meteorology does not conduct any research, and this seems to have badly affected their human resource development programs too. The current S&T personnel strength of the Department of Meteorology stands at 31, out of which only 17 have an M.Sc. or an equivalent qualification while the others are B.Sc. graduates. As mentioned earlier none of them possesses a postgraduate research degree such as an M.Phil or a Ph.D. Although they have been given local and foreign training annually (see Figure 2), training programs are not aligned to benefit the institutional development towards research. This situation is reflected in their research output during last three years which is limited to weekly weather reviews and monthly weather synopsis (self assessment report).

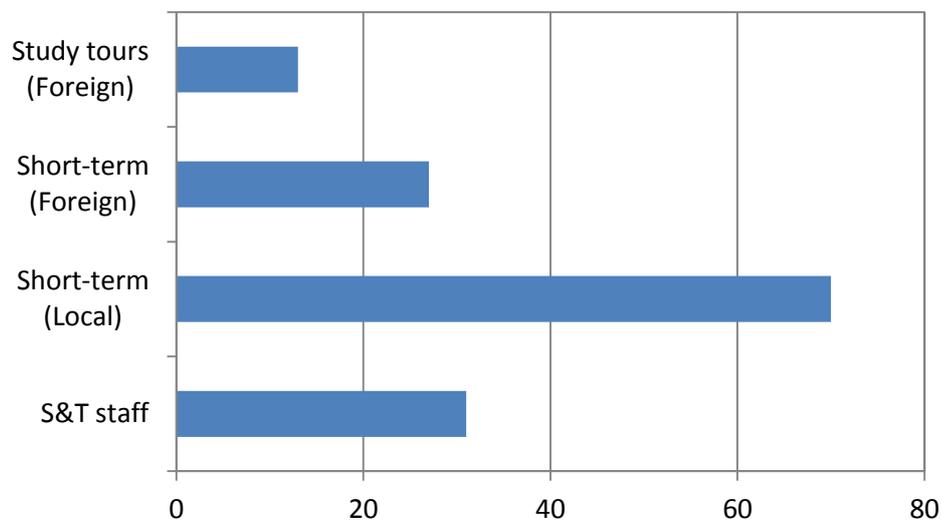


Figure 2: S&T staff strength and type of training given (2011)

5. CONTRIBUTION TO NATIONAL DEVELOPMENT

Meteorology is now widely recognized as a scientific discipline which has an intimate link with the people, society and development. Recent advances in meteorology have made life safer and less vulnerable to the dangers of natural hazards, and even development goals are met with higher productivity and fewer constraints. Thus, the study and monitoring of weather has a pivotal role to play in the development agenda of the country. For example, agricultural practices are subject to the frequent changes in weather conditions. If the Department of Meteorology can predict the approaching weather condition with a reasonable lead time and accuracy then, it enables farmers and agriculturists to plan their activities accordingly, while saving time, input and other valuable resources. The fishing industry around the island depends on accurate and dynamic weather forecasts which enable the fishermen to venture into the sea at favorable times. Moreover, it also leads to the assurance of their safety and mitigates the chances of them encountering life threatening storms. The aviation industry thrives on meteorology. It is simply beyond imagination to proceed with the risk of flying an aircraft without knowledge of the weather pattern throughout the route. This information is made available to the international airlines operating in the region through the Department of Meteorology.

Approximately 20-25% of the daily national energy demand of Sri Lanka is met through hydropower generation by large reservoirs. Having dual purposes in most cases, their operations are carefully scheduled in line with the approaching weather conditions. Hence, the skill and capacity of the Department of Meteorology in short range and long range weather forecasting will help the Ceylon Electricity Board (CEB) to manage these reservoir water levels efficiently for both power generation and the provision of irrigation water for the Mahaweli Authority of Sri Lanka (MASL) simultaneously.

The country's flourishing tourism industry also owes a lot to the science of weather forecasting. It is observed that the tourism hubs within the island have their own peak seasons, which have obviously been decided based on the favorable climate prevalent in those locations. The three armed forces of the country which have the mandate of national security also need timely weather information for their operations and routine training exercises. In addition, the industry and construction, sports and social recreation sectors are also becoming increasingly weather sensitive in their routine activities. Thus, it is very clear that meteorology has a monumental role to play in food security, the lives of human beings, and the economic development and national security of the country.

Meteorology has now become more important than ever before by several folds due to the recent climate changes that have caused weather related natural hazards such as floods, landslides, cyclones and droughts to become more frequent and virulent. Therefore, the time has now come to re-align the structure and operations of the Department of Meteorology in order to meet the environmental and economic challenges of the new millennium.

6. RECOMMENDATIONS

In order to ensure that the Department of Meteorology meets its intended obligations to the local and international community and enhances its productivity for satisfactory operation to meet the growing demands, as stated in the executive summary, three areas require strengthening. Although the Department of Meteorology needs to acquire new technologies and modernize their services, some of the key issues that affect the provision of the best possible service with the available facilities to the stakeholders are listed here. The review team believes that unless the Department of Meteorology first addresses these issues, it will not be able in a position to absorb the benefits offered by new and advanced technology.

6.1 Management

- There is a lack of communication between the management grades and the other grades. This has led to the mistrust among the lower grades of the decisions taken by the management. Unless there is a conducive working environment, the optimum potential of the existing human resources cannot be harnessed. It is recommended as a first step, that the management attends without delay to the queries and grievances of the employees, including due promotions and increments.
- Although it is not a practice in most of the government departments to work according to a strategic plan, reviewers believe it is high time for Department of Meteorology to introduce this as a good practice. The mandate of the Department of Meteorology should go beyond the state of a service department as its progress and development depend entirely on research. Therefore its operation and the management should conform to that of a research institute which generally works according to a development plan.
- Currently, the annual plan of the institution is prepared by the Board of Directors without input from the other staff categories. Also, the plan is not discussed to obtain feedback from the other employees. Unless the overall plan of the institution is known by the different ranks, employees cannot be held responsible for the assigned work. The preparation of a 5-year rolling plan following a bottom-up approach is recommended. Each year, a draft plan should be presented to all levels and their feedback should be obtained before it is finalized. Once the plan is finalized the entire staff should be informed of the contents and targets of the plan and their contributory tasks.
- There is no culture of monitoring and evaluation of work carried out by the institute. It is recommended that monthly meeting called by the Board of Directors be held with the participation of all heads of divisions, during which the progress related to the activities outlined in the annual plan are discussed. In addition to monitoring physical and financial progress, indicators should be developed with annual targets to monitor expected key outcomes.
- The contribution and the role played by certain staff categories are not recognized (i.e. Graduate RAs). Consultations with Administrative and Financial staff and

recognizing of their duties are weak. The tasks of every staff category should be clearly identified and recognized. Delegation of work should be carried out to achieve common goals and objectives of the institutional plan.

- The roles and functions of the various divisions are not aligned with the vision and mission of the institute. There is duplication of work which should be avoided. For example, the rainfall, climate and data divisions can be amalgamated. It is recommended that the department is restructured according to the WMO guidelines. Especially, separate divisions to undertake research and training should be established. A division to deal with the public, school children and general publications is also recommended. Since credibility and reputational of an institute is an asset, there should be a separate division with skilled personnel to deal with information dissemination to the general public.
- It is recommended to establish an advisory panel with outside participation, to obtain advice and views on future directions. An annual meeting should be held with stakeholder participation to obtain performance feedback and incorporate the growing needs of the various sectors.

6.2 Technical

- It is commendable that the department is looking into expanding the regional centers to cater to new requirements and stakeholder needs. However, the department should first prioritize the vital functions carried out by them and consolidate them before venturing into new areas. For example, since the NMC and the Air port services carry out important services, allocation of sufficient human resources and equipment for the proper function of these two should be given the highest priority. The manpower requirements of the existing regional centers should also be looked into before more regional centers are established.
- Although there are technological advances, many of the regional centers transfer data manually. As the first step, it is recommended that all the regional centers are provided with a desktop computer and internet connection (HSPA) with the aim of improving communication and the electronic transfer of data. This may even lead to the possibility of issuing data from remote centers in the future.
- The automatic Weather Stations (AWS) are not used effectively. At present data from the AWS appear to be having a reliability issue. They should be calibrated and the shortcomings should be minimized before they are amalgamated to the weather station network. Since there are 38 AWS, new regional centers could be established with a small cost by distributing the AWS to strategic locations. In practice, they could run independently with minimum supervision. AWS could also useful when establishing mobile weather stations to monitor weather parameters when important events take place. Those who have received training related to AWS should lead this activity.
- Many of the instruments are not calibrated (for example, the Master Barometers have not been calibrated since 1987). Priority should be given to calibrating and maintaining the accuracy of equipment. A number of manual operations such as self

recording chart readings can be automated so that the accuracy can be improved and the available manpower could be deployed to more fruitful operations.

- Asset management is an area that needs attention. Since there are number of regional centers, equipment, vehicles and infrastructure should be well maintained. It is recommended that a division to manage the civil infrastructure and equipment is created.

6.3 Research

- Currently the department receives foreign training for a number of service grades. However, the nomination of officers for training programs should be carried out in a transparent manner. Past records should be maintained and priority should be given to suitable candidates who have not received prior training. If some officers are over trained while others have not received any training at all, it indicates very poor management skills. Training programs should be decided so as to fulfill the requirements stated in the strategic plan. A mechanism should be in place for officers to disseminate their knowledge for the benefit of others once they have completed their training. It is also recommended that those who have already received training in various systems are assigned to manage those systems.
- Being a Department with so much of state-of-the-art equipment and data resources at hand it should be capable of providing the required research training leading to M.Phils and Ph.Ds to its own staff and even to outsiders if proper plans are being drawn up. Currently the use of all Government and foreign funded projects implemented by the department is just limited to acquiring of data. It is recommended that the department should make use of these facilities to initiate research programs at the postgraduate level and train their S&T personnel.
- No statistical analysis is carried out at present to determine the accuracy of the data. Often, officers use their experience to detect errors instead of using a systematic approach. There is no organized supervision of outstation offices and collaborative stations and hence the quality of the data is deteriorating. Improving the quality of data is a priority and this should be handled by designing a specific training program for the relevant officers. If expertise is required from outside, suitable resource persons should be invited to the training programs.
- There is very little interest in research, and obtaining funds from external sources to conduct research is weak. A team work culture to collaborate with other institutions is alien to most of the scientific staff. There have been no peer reviewed publications during the last 5 years. Current S&T officers in the institute do not have the acceptable postgraduate qualifications to undertake research (at least an M.Phil). It is recommended that the institute collaborates with a suitable university to create a path for scientific officers to obtain research qualifications as well as the skills required to cover all the sections.
- The library is in disarray despite being the only one in Sri Lanka containing a fair number of periodicals and text books related to meteorology. The library should be reorganized in a spacious room/area with the assistance of the Library Science

Board. This should be enhanced with meteorology related literature and journals. Access to online journals related to meteorology through the library is another option to explore. This is essential if the Department of Meteorology is planning to improve the research output in the future.

7. Management and S&T Output Assessment

1. Assessment of Institutional Response to External and Internal Environment

Management practice	Level of Practice (Performance Indicators)			Comments / Evidence
	Strong	Moderate	Weak	
Government policies and development goals are used/ considered to establish goals and plan organizational strategy for the institution		X		Early warning forecasts are available for Tsunami and cyclones
The organizational mandate (as specified by the relevant Act) is considered in strategic planning			X	No comprehensive strategic plan is available
The institution is responsive to changes in Government policies and strategies	X			Collaborate with DMC as directed by the Government
Factors such as strengths, weaknesses, threats and opportunities are considered in strategic planning			X	No proper SWOT analysis has been carried out
Stakeholders needs are taken into consideration in strategic planning			X	No mechanism to obtain stakeholder requirements
The Board of Governors is involved in strategic planning		X		Director board is involved in planning
The extent to which staff members are involved in strategic planning			X	Different staff grades are not consulted
Government allocations and alternative funding opportunities (donor funding) are considered in strategic planning		X		Alternative funding opportunities are available through donors
The extent to which policies and plans of the organization are reviewed and updated			X	No evidence of monitoring and evaluation

2. Planning S & T programs and setting priorities

Management practice	Level of Practice (Performance Indicators)			Comments/ Evidence
	Strong	Moderate	Weak	
National development goals are considered in planning programs & setting priorities		X		Locally initiated programs are rare
Board of Governors participate in planning and priority setting of program		X		Only Director board is involved in planning
The extent to which the staff of the institution participate in programme planning and priority setting			X	Different staff grades are not consulted
Stakeholder interests are considered in programme planning			X	No mechanism to obtain stakeholder requirements
The extent to which programmes are planned and approved through appropriate procedures			X	No acceptable procedure is available
The extent to which the availability of funds (government allocations and other funds) and generating funds are taken into consideration in planning programmes		X		Planned activities are based mainly on government funds
The obtaining of necessary equipment is considered in planning programmes		X		Most programs are externally initiated
Sstakeholders are represented in the institution's planning and review committees.			X	No such mechanism
The extent to which socio economic and commercialization of aspects are considered in programme planning.			X	No such mechanism
Effectiveness and efficiency of institutional procedures in approving new S& T programmes.			X	No such mechanism

3. Planning S& T / R& D Projects

Management practice	Level of Practice (Performance Indicators)			Comments/ Evidence
	Strong	Moderate	Weak	
The staff is provided with guidance for project planning			X	No such mechanism is available
Previous research results/data are used for planning projects			X	No such mechanism is available
The extent to which the institution follows a formal process for preparation, review and approval of projects			X	No such mechanism is available
The extent to which organizational plans (e.g. medium-term plan, corporate plan, strategy etc.) are used to guide project selection and planning			X	No corporate plan is available
Multidisciplinary projects/ activities are encouraged by the institutions		X		Most programs are externally initiated
Foreign collaborations are encouraged and incorporated in planning.	X			Regional collaborations are strong
Partnership with private sector is encouraged by the institution			X	No such evidence is available
The extent to which development research/activities are considered in planning projects			X	No corporate plan is available
The extent to which basic research are considered when planning projects			X	No recent culture or research output is available
The degree to which adverse effects on environment are considered in planning projects				Not applicable

4. Project management and maintenance of quality

Management Practice	Level of Practice (Performance Indicators)			Comments/ Evidence
	Strong	Moderate	Weak	
The effectiveness of the procedures for resource allocation at different levels (organization, departments, program etc.)			X	There are no well defined procedures available
Ensuring that instruments, equipment and infrastructure facilities are sufficient for implementation of projects		X		Although facilities are available, maintenance is weak
The effectiveness of administrative procedures and support for project implementation (procurement and distribution of equipment and materials, transport arrangements, etc.)			X	Resources are not effectively allocated
Formal monitoring and review processes are used to direct projects towards achievement of objectives			X	There is no formal monitoring process
The extent to which the researchers are supported by the required technical / field staff.		X		Technical support is available
Ensuring that established field / lab methods, and appropriate protocols are used			X	Quality assurance procedures are not in place
Research projects/ S& T activities are completed within the planned time frame.		X		Most programs are externally initiated
Ensuring that scientists / researchers have access to adequate scientific information (scientific journals, internet, international databases, advanced research institutes, universities etc.) that strengthens the quality of research.			X	Facilities are available but no research activities are conducted by the S&T staff
The extent to which quality assurance practices are followed by the institutions			X	Quality assurance procedures are not in place
Ensuring that researchers/ scientists have access to computers and necessary software		X		Facilities are available at a reasonable level

5. Human Resource Management

Management Practice	Level of Practice (Performance Indicators)			Comments/ Evidence
	Strong	Moderate	Weak	
The institution maintains and updates staff information in a database (including bio data, disciplines, experience, publications, projects)			X	No such database is available.
The institution, plans and updates its staff recruitments based on programme and project needs			X	Recruitments are based on available cadre positions. Need overhaul revision
The effectiveness of the selection procedures and the schemes of recruitment			X	Need overhaul revision
Training is based on institution and program objectives and on merit,			X	Training is driven by externally initiated programs. Need a transparent procedure for providing training.
The effectiveness of the procedures in promoting a good working environment and maintaining high staff morale.			X	No such mechanism is available.
The effectiveness of staff performance appraisals			X	No such mechanism is available.
The effectiveness of rewards and incentive schemes in motivating the staff			X	No such mechanism is available.
The effectiveness of managing staff turnover, absenteeism and work interruptions.			X	No such mechanism is available.

6. Management of organizational assets

Management Practice	Level of Practice (Performance Indicators)			Comments/ Evidence
	Strong	Moderate	Weak	
The ability of the institution to carry out its mandate and the assigned statutory powers		X		Freedom is available to carry out its mandate.
Infrastructure (buildings, stations, fields, roads) is satisfactorily maintained.			X	Asset management is weak.
Vehicles and equipment (lab, field, office) are properly managed and maintained.			X	Vehicles are not adequate for field work. Maintenance and calibration of equipment need improvements.
The effectiveness of procedures to ensure that equipment are in working order			X	No such mechanism is available.
The effectiveness of the institution's overall strategy in generation and proper utilization of funds			X	DOM is a service based institution. Generated funds are returned to the treasury.
The extent to which the institution identifies opportunities for income generation and cost recovery			X	Income generation is limited to sales of data. Other opportunities are available.
The extent to which the intellectual property rights of the institute are protected				Not applicable

7. Coordinating and integrating the internal functions/units/activities

Management Practice	Level of Practice (Performance indicators)			Comments/ Evidence
	Strong	Moderate	Weak	
The extent to which institution is evaluated internally and restructured based on current needs			X	No such mechanism is available.
The effectiveness of internal communication and coordination mechanisms		X		Need improvements
Institution's overall direction and coordination are provided by a central planning committee / unit.		X		Director board makes the decisions
The extent to which different units are assigned clearly defined functions			X	Duplication of work is evident.
Responsibilities of research / management staff are clearly identified			X	No research output. Need improvements
Effectiveness of using appropriate reporting procedures and feedback in management at different levels			X	No such mechanism is available.

8. Partnership in managing information dissemination

Management Practice	Level of Practice (Performance Indicators)			Comments/ Evidence
	Strong	Moderate	Weak	
The institution systematically plans and performs dissemination of information		X		Adequate procedure is in place for information dissemination
The extent to which the institution plans and maintains linkages with key partners for sharing and dissemination of information		X		Data and information is shared with regional partners. However, no sharing take place with local partners.
The effectiveness of institutional procedures for technology transfer		X		Technology transfer take place from regional partners to DOM.
The effectiveness of the system to obtain feedback from different types of stakeholders			X	No mechanism to obtain stakeholders feedback

9. Monitoring, evaluation and reporting procedures

Management Practice	Level of Practice (Performance Indicators)			Comments/ Evidence
	Strong	Moderate	Weak	
The institution monitors and evaluates (M&E) its own activities periodically			X	No M&E takes place
M&E is supported by an adequate management information system (MIS), which includes information on projects (e.g. costs, staff, progress, and Results).			X	There is no MIS available.
The extent to which S& T results and other outputs are adequately reported internally (e.g. through reports, internal program reviews, seminars).			X	S&T output is weak. No period publication of annual reports
External stakeholders contribute to the M & E process in the institution			X	No mechanism to obtain stakeholders feedback
The extent to which the results of M&E are used for project/ research planning and decision-making.			X	No M&E takes place

10. S&T Output Assessment

Output Category	Level	General Comments on quality and relevance of outputs and productivity of institution
1. Technologies Developed	Weak	DOM depends on imported technology. Situation is expected to change with Doppler radar project.
2. Technologies transferred to industry		Not applicable
3. Information Dissemination / Extension <i>Publications</i> S & T institutional review reports, Training manuals, Advisory leaflets, Maps, Posters etc. <i>Dissemination events</i> Workshops and seminars, Conferences, Exhibitions, Media events, Open days, Demonstrations	Moderate Strong	Limited to weekly weather review (Web) and monthly weather synopsis World meteorology day celebration, open days for school children, existing links with the media and DMC for information dissemination
4. Publications <ul style="list-style-type: none"> • Research papers in ISI journals • Other research papers • Conference proceedings • Books and monographs • Technical reports • Research reports 	Weak	Although there are 31 S&T officers out of which 17 are having postgraduate qualifications, there are no research publications within last 5 years.
5. Patents		Not applicable
6. Services <ul style="list-style-type: none"> • Data bases developed • S&T surveys and maps • Science popularization activities • Consultancy services • Recommendations in S&T matters 	Moderate	Available meteorological and climatological databases; Services provided to Agriculture and Irrigation departments as well as Ports and Aviation authorities
7. Training <i>Staff training programmes</i> <i>Training programmes for stakeholders</i>	Weak	Foreign training is limited to S&T staff only; Bulk of local training is also given to S&T staff; Stakeholder training programs are limited

Total S & T staff strength of institution 31

Comments on productivity of institution based on outputs and S & T staff strength

Although there are 31 S&T officers, research output is nil. New initiatives are required to uplift research culture. Training should be provided focusing on the objectives of the institution rather than availability. Expertise should be sought from Universities and research institutions to improve quality.

ANNEXES

- A. Site visit program
- B. List of officers met during site visit
- C. References

ANNEX A: Site visit program

PROGRAM

Thursday 10th May 2012

- 09.30 am - Visit by review panel members to the Department of Meteorology
09.30 am – 10.00 am - Meeting with DG and Senior Staff members. Presentation by the Department of Meteorology
10.00 am – 11.00 am - General Discussion with Senior Staff members
11.00 am – 12.00 am - Discussion with Scientific Services and Engineering Service Staff
12.00 am – 01.00 pm - Lunch
01.00 pm – 02.00 pm - Discussion with Middle level and Technical staff (Observers, Communication Staff, Technicians)
02.00 pm – 03.00 pm- Discussion among Panel Members
03.00 pm – 03.30 pm- Tea Break
03.30 pm – 04.30 pm- Discussion with Unions on improving services

Friday 11th May 2012

- 09.00 am – 12.00 am - Visit Divisions of the Department of Meteorology (Computer Division, Agro-meteorological Division, Forecasting Division, Instrumentation Division, Communication Division, Electronic Division, Radar Division)
12.00 pm – 01.00 pm- Lunch
01.00 pm – 02.00 pm- Discussion with Accountant & Administration Division
02.00 pm – 03.00 pm- Discussion among Panel Members
03.00 pm – 03.30 pm- Tea Break
03.30 pm – 04.30 pm- Wrap up Session - Meeting with DG and Senior Staff Members

Friday 18th May 2012

- Site Visit - Airport Station

Friday 25th May 2012 – at NASTEC

- 10.00 am – 12.30 pm - Stakeholders Meeting

ANNEX B: List of officers met during site visit

NASTECS Staff

- Dr. Muditha Liyanagedara, Acting Director
- Ms. Asha Pitadeniya, Scientific Programme Manager

Meteorology Department

- Mr. S.H. Kariyawasam, Director, Administration & Operations
- Mr. L. Chandrapala, Director, Finance & Projects
- Mr. D.J.A. Weerawardena, Deputy Director, Outstations & Foreign Training
- Mr. S.R. Jayasekara, Deputy Director, General & Aviation Weather Forecasting, Disaster Management Activities & Research
- Mr. M.D. Dayananda, Deputy Director, Data & Instruments
- Mr. K.H.M.S. Premalal, Deputy Director, Climate Change & Publicity

Scientific and Instrument Division

- A.G.M.M. Wimalasuriya, Meteorologist
- A.L.K. Wijemannage, Meteorologist
- Nuwan Kumarasinghe, Electronic Engineer
- W.P.K. Priyadarshana, Electrical Engineer
- K.M.D.L. Sucharitharatne, Meteorologist
- J.A. Tilakerathna, Meteorologist
- D.M.B. Suraweera, Meteorologist
- S.P. Wahalawatta, Meteorologist
- E.A.K. Edirisooriya, Civil Engineer

Administration Branch

- U.P.A.T. Dilumi Karunanayake, Assistant Director, Admin
- K.W.A.D.L.P. Karunasekara, A/O
- Maheshika Pathiraja, C/C
- Kalpani Wanasuriya, M/A
- Sachi Rajapaksa, M/A
- Osaka Damayanthi, M/A
- Deepa Chandani, M/A

Finance Branch

- D.U.A. Edirisinghe, Assistant, Director, Finance
- N.D.C. Hettiarachchi, M/A
- D.M. ChamikaDissanayake, M/A
- G.K.P.Ruweendra, M/A
- H.P.W. Kulasooriya
- W.M.C.N. De Silva, Trainee
- A.H. Hasini Farwin, Trainee

Technical Staff

- G.G.A. Premaratne
- V.P.C. Lokuhetti
- W.A.T.K.P. De Silva
- M.V.P.J. Kurera
- I.S.M. Abayasinghe
- K.B.C. Sampath
- M.K.M. Perera
- N.A. Meththasinghe
- W. HansaniDissanayake
- G.C.M. Rajapaksa
- C. Hettiarachchi
- L.R.T.S. Sirisena
- J.D. Nuwanpriya
- P.K.J. Piyatilake
- S.R.M.S.S. Rajapaksa
- R.A.R.M. Gunatilake
- K.G. SrinithaGamage

Research Assistants

- H.M.R.C.Herath, Research Assistant
- D.W.T.T. Parshila, Research Assistant
- H.A.S.U.Hapuarachchi, Research Assistant
- K.A.K.T.W. Weerasinghe, Research Assistant
- A.M.A.W.D. Alagiyawanna, Research Assistant
- R.W.W. Bandara, Research Assistant
- P.K.R. Jayasena, Financial Assistant - Investigations

Other Staff

- J.A. Rohana Kumara, Labour
- M.S. Aberuwan, Labour
- K.G. Susiripala, Book Binder

Unions

- E.S.D. Wimalaweera, Communication Officers union
- V.P.S. Lokuhetty, President, Meteorological officers union
- M.L.R. Senavirathna, Secretary, Meteorological officers union
- A.G.M.M. Wimalasooriya, Meteorologists union
- A.L.K. Wijemannage, President, meteorologists union

ANNEX C: References

1. Disaster Response Preparedness Assessment Mission report, UNDAC, 2011
2. Self Assessment Report, Department of Meteorology, 2012
3. Review manual for performance review of S&T institutions, NASTEC, 2008
4. Guidelines for the Education and Training of Personnel in Meteorology and operational Hydrology, WMO, 2009
5. Development of Meteorology in Sri Lanka, Lareef Zubair, 2002