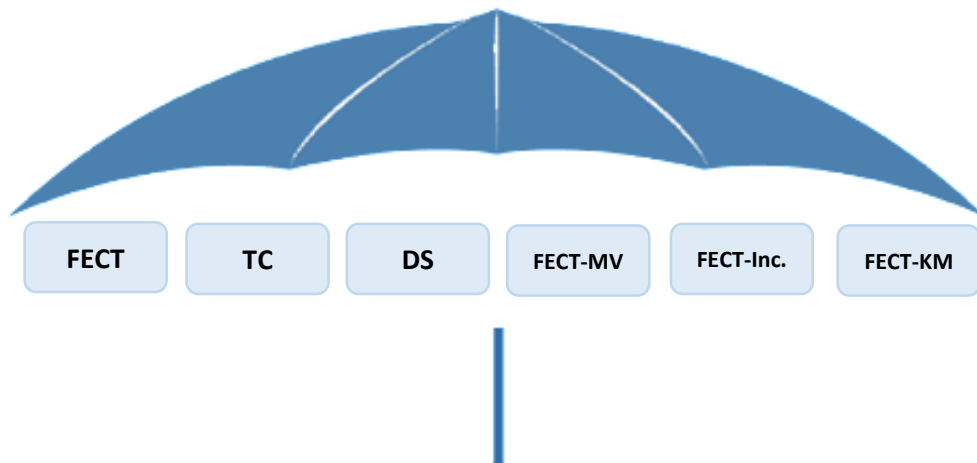


FECT

FEDERATION FOR ENVIRONMENT, CLIMATE AND TECHNOLOGY

Annual Progress Report 2019



Federation for Environment, Climate and Technology is a Federation comprising Foundation for Environment , Climate and Technology - FECT (Reg. No. – N (A) 1148, GA 56), Tropical Climate Guarantee Ltd. – TC (Reg. No. – GL 2438), Disaster Services – DS (Reg. No. – GA 00209570), FECT– Maldives - FECT-MV, FECT – Inc. which is registered in New York, USA (DOS ID No. – 3976120) and FECT – Comoros - FECT-Km.

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HIGHLIGHTS

We had an eventful and fruitful year at Federation for Environment, Climate and Technology in 2019 – a year of consolidation in our 20-year informal history. We have kept up to the rising demands, projects have been completed, proposals submitted and new directions established. Staffing has adapted in numbers, skillsets and teamwork. IT systems are being maintained and the IRI data library installed on FECT servers is functional. Instrumentation for weather, air quality and soil moisture was installed and maintained in Sri Lanka and Maldives. We completed projects on Tea and STEM education.

PUBLICATIONS AND CONFERENCES

Our staff participated and presented at workshops in Sri Lanka and Maldives.

PROJECTS AND PROPOSALS

We had a portfolio of 3 projects. We completed a project on STEM education. We are undertaking projects on dengue and climate and air quality. We developed nine proposals on XXXX.

INSTRUMENTS

We installed and are maintaining automated web-enabled environmental observations systems for weather, soil moisture and air pollution in Sri Lanka and Maldives. New instrumentation was installed at Nawalapitiya, Norochcholai, Aruwakkalu in Sri Lanka and Thinadhoo in the Maldives.

WEBSITES

Our websites have become richer. We setup a website to promote STEM education. Disaster.lk was awarded a winners trophy in the category of Digital Innovation in the fields of Environment and Green Energy. We maintained operational climate services for Sri Lanka and Maldives, generating content, disseminating regularly, responding to queries, and enabling researchers both within and without. Our library holdings and catalogues were maintained.

ADMINISTRATION

Our administration is rising to the challenges of meeting regulatory challenges and reporting and on the new constituent organizations. We maintained filing systems, library catalogues, internal blogs, kanban boards and wiki pages. Digital archiving remains a weakness along with Disaster Risk Management.

STRATEGIC REVIEW

We have had staff brainstorming. Last year's reviews identified some critical areas for improvement as

- 1) Digital Archiving
- 2) Disaster Risk Management for IT
- 3) Ensuring legal and regulatory compliance
- 4) Identity staffing needs in IT, Legal, Research, Writing and Project Management
- 5) Improved Project Monitoring, Data Management and Performance Management
- 6) Better securing our Physical Infrastructure and

We have taken further modest steps in items 1-6 above but work remains– in some areas such as staffing, our recruitment was followed by staff departure. We picked up on our work in instrumentation and in research in dengue and climate.

We have completed the 15th Anniversary retrospective, updated the staff handbook and the outline of our charitable activities.

OPERATIONAL SERVICES

We continued to disseminate our weekly and monthly climate reports for Sri Lanka and Maldives. Our website gave a running update on the current seasonal climate conditions. Data were continuously being obtained through our instruments and assimilated for climate analysis through the Data Library.

SOCIAL AND EDUCATIONAL SERVICE PROJECTS

We maintained a website that we developed for a local women's welfare group with the support of our staff. An environment day program was conducted for school students and an awareness presentation on dengue were conducted in Akurana.

AWARDS AND ACHIEVEMENTS

The FECT portal - www.disaster.lk - was adjudged the winner in the Environment and Green Energy Category of the Digital Social Innovation Awards by Sri Lanka's Information and Communication Technology Agency (ICTA). The award was presented at the Gala Event held on the 18th October, 2019 at the Shangri-La hotel in Colombo.

CHALLENGES AND RESPONSE

- The most significant challenge that we faced this year was turnover of staff which led to some knowledge and experience gaps.
- The regulatory and legal work took our time and treasure but these matters are now being managed well.
- We are trying to manage data acquisition which is expensive in Sri Lanka by setting up instruments and finding ways to acquire data.
- In Sri Lanka, work was slow after the Easter Sunday Attacks.

CODA

The need for improved climate risk management, understanding of climate (change at least) and better disaster risk management means is being recognized as more important than ever. Nature reinforces this from time to time. Having built up our capacities, we can be more ambitious in helping vulnerable people around the Indian Ocean meet these threats as best in the coming years.

PUBLICATIONS

Papers in Progress:

- Zubair, L., Ahmed, N., Mohamed, M., Zahid. Climate Drives the Seasonal and Regional Variation in Dengue Incidence in the Maldives.
- Zubair, L., Lokuhetti, R., Visvanathan, J., Hadgie, T. and Ellegala, P. PM2.5 Sensors Detect Transport of Particulates from Sri Lanka's Coal Power Plant to Its Highlands.
- Nijamdeen, A, Zubair, L, Salih, R, Lokuhetti, R, Hadgie, T, Randiwela, M. Seasonal Climate variability Impacts Tea Production across Tea Regions of Sri Lanka
- Kusumawathie, P. Finer scale risk analysis of dengue in Medical Officer of Health area Akurana in Sri Lanka.
- Zubair, L. and Ellegala, P. Remarkable Increase of Ambient Air pollution Levels in Sri Lanka on 5th and 6th November, 2019 is attributed to transport from the Indian Sub-Continent

Technical Reports:

- Ellegala, P. and Zubair L. *Remarkable Increase of Ambient Air Quality Levels on 5th and 6th November, 2019*. FECT Technical Report 2019. Foundation for Environment, Climate and Technology, Digana.
- Ellegala, P. and Zubair L. *AERMOD Modeling Method*. FECT Technical Report 2019. Foundation for Environment, Climate and Technology, Digana.

- Ellegala, P. and Zubair L. *Clarification of Input data and the model outputs of Pollution Dispersion Analysis*. FECT Technical Report 2019. Foundation for Environment, Climate and Technology, Digana.
- Ellegala, P. and Zubair L. *Analysis of PM1.0, PM2.5 and PM10 Air Quality Data in Serakkuliya*. FECT Technical Report 2019. Foundation for Environment, Climate and Technology, Digana.
- Ellegala, P. and Zubair L. *Variation of CO₂, PM2.5 and PM10 in Akurana, Digana and Kandy*. FECT Technical Report 2019. Foundation for Environment, Climate and Technology, Digana.

CONFERENCES

TechCamp - Clean Air for South Asia, Kathmandu, Nepal, July, 2019.

PROJECTS

- Partnership for Enhanced Engagement in Research (PEER) - Dengue Project continued.
- Completed projects on PEER – Science, Technology, Engineering and Mathematics (STEM), Drought and Climate and Disaster Services this year.

CHARITABLE ACTIVITIES AND EDUCATIONAL PROGRAMS

- Environmental Day program in collaboration with Akurana Pradeshiya Sabhawa for the students of Akurana Balika Vidyalaya.
- Dengue awareness presentation for a group of residents of Akurana.
- 2 STEM education workshops for middle school students of southern Maldives.
- We continued updating the website of Akurana Women's Welfare Association.

ADMINISTRATION AND IT

- Our accounting systems, audits and company reporting were completed well.
- Inventories of books, files, journals and reports were made more accessible.
- IT systems have kept up to the demands of additional staff and have been upgraded.
- We are working on cloud based accessibility to information resources.
- We keep complaint with the labour, financial and company law.

COMMUNICATION MATERIAL

Institutional Documents:

- The Annual Progress report for 2018 and the Climate Smart newsletter – second issue were finalized.
- The 15th Anniversary Review and Review of our Charitable Activities were updated.

Brochures/ Flyers:

- Updated FECT-MV brochure.
- Flyer for our work on Air Quality was prepared.
- Project flyers for our Disaster Services project and STEM education project were prepared.
- An informational flyer on the Thinadhoo Ambient Weather Station was prepared.

DISCUSSIONS / MEETINGS

Internal Meetings:

- July 2019 – Mid Year Review Meeting for FECT staff at the Akurana library with the participation of Dr. P.H.D. Kusumawathie and Prof. Wickramagama to mainly review the ongoing projects – STEM education in Maldives and Dengue project.
- August 2019 – Mid Year 2nd Review Meeting for FECT staff at the Akurana library to discuss the organizational themes and future plans of projects.

- December 2019 – Review meeting for FECT staff at the Old Trinitians’ Sports Club. With the participation of invitees, Dr. P.H.D. Kusumawathie and Prof. Wickramagamage. Staff presentations conducted and progress of projects reviewed.

External Meetings:

- January 2019 – Disaster Services project meeting with stakeholders at the Satyodaya Conference Hall.
- April 2019 – Dr. Lareef Zubair and Tuan Hadgie, STEM project planning meeting in Maldives.
- June 2019 – Piushani Ellegala, ‘TechCamp’ Air Quality workshop, held in Kathmadu, Nepal, 29-31 July.
- August 2019 – Lareef Zubair, meeting in Maldives regarding FECT-MV registration.
- September 2019 – Prof. Wickramagamage, Piushani Ellegala, Chayana Gunathilake, Tharani Kailaivasan and Ruqsha Shameer, Faculty of Science Industry Day (FOSID) 2019 – held at the Faculty of Science, University of Peradeniya, on September 20th.
- September 2019 – Dr. Lareef Zubair, Science Fair and STEM workshops in Gaafu Dhaalu Atoll Education Centre and Huvaadhoo School, Maldives.
- October 2019 – Ashara Nijamdeen, Chayana Gunathilake, Tuan Hadgie and Shalini Somasinghe, Career Fair, NIBM-Kandy at NIBM premises in Kandy.
- October 2019 – Chayana Gunathilake, Aqeel Ahamed, Dinaskar Shathiyendra, Tharani Kailaivasan and Ashara Nijamdeen, e-Swabhimani Award Ceremony at the Shangri La Hotel, Colombo.
- October 2019 – Ashara Nijamdeen and Chayana Gunathilake, Digital Security Workshop held on 26th and 27th of October at the Ozo Hotel, Kandy.
- December - ADD OTSC meeting

FEATURE ARTICLES

- June 2018: Thilani Bandara, Sandamali Ranasinghe, Samsudeen Fazal and Lareef Zubair ‘ඉහුවාර්ගික රටක ජාතික සමභීය ගොඩනැගීමේදී අපට වැරදුණේ කොතන ද?’ (Where did we blunder when building the national unity of a multi- ethnic country?) (Ada, pg. no – 16, 1510 words)
- June 2018: Lareef Zubair, ‘Norochcholai ash contaminates Lanka’s western atmosphere’ (The Sunday Times, ST2: pg. no – 10, 1238 words). - I shall write something today

MEDIA CITATIONS

- February 2, 2019: ‘Climate scientist urges Govt to study risks of cloud seeding’. By Namini Wijedasa, The Sunday Times.
- March 31, 2019: ‘Artificial rain: Contradictory data; experiment suspended’, The Sunday Times. <http://www.sundaytimes.lk/190331/news/artificial-rain-contradictory-data-experiment-suspended-343362.html>
- April 2, 2019: ‘THE MALDIVES: PARADISE LOST?’ By Alexander Cavaluzzo, Newsweek. <https://www.newsweek.com/maldives-paradise-lost-1380398>
- November 10, 2019: ‘4 new measuring instruments as air quality drops to breathtaking level’. By Shaadya Ismail, The Sunday Times. <http://www.sundaytimes.lk/191110/news/4-new-measuring-instruments-as-air-quality-drops-to-breathtaking-levels-377316.html>
- November 30, 2019: ‘Is Sri Lanka witnessing a shift in rainfall patterns?’ By Meera Srinivasan, The Hindu. <https://www.thehindu.com/news/international/is-sri-lanka-witnessing-a-shift-in-rainfall-patterns/article30124861.ece>

ONGOING GRANTS

- PEER Cycle 4, Sup.: STEM Education and Capacity Building for Resources and Risk Management in Remote Outposts capitalizing on PEER projects on water, drought and hazards: Gaafu Dhaalu Atoll in Southern Maldives (PI – P. Wickramagamage Co PI - Lareef Zubair, July 2018 – June 2019)

- **PEER Cycle 7:** Developing Dengue Risk Predictions from Environmental, Entomological and societal information to aid public health management in Sri Lanka. From the US National Academy of Sciences (PI – P. H. D. Kusumawathie, 2019 – 2021)

Grant Reporting:

- Final Project Report was submitted in January 2019 to Foundation for the Promotion of Open Societies, on ‘Documenting the March 2018 Mob Violence in Kandy Sri Lanka: a Pilot Project towards Assessment of Risk of Sectarian Violence’
- 2 Quarterly Reports and one report for the extension were submitted to Partnerships for Enhanced Engagement in Research Science, on ‘Can drought, flood and landslide hazard be skillfully assessed at fine spatial resolution from combining constrained streams of observed, remotely sensed and model predicted data in Sri Lanka and Maldives?’
- One Quarterly Report and the Final Project Report were submitted to Partnerships for Enhanced Engagement in Research Science, on ‘STEM Education and Capacity Building for Resources and Risk Management in Remote Outposts.’
- 2 Quarterly Reports and the First Annual Report were submitted to Partnerships for Enhanced Engagement in Research Science, on ‘Developing Dengue Risk Predictions from Environmental, Entomological and societal information to aid public health management in Sri Lanka.’

Concept Notes:

- Can Natural Hazard Assessments be Effectively Communicated to Improve Disaster Risk Management of Marginalized and Vulnerable Communities in Sri Lanka? PEER Cycle 8 – USAID.
- Supporting Income-Generating Vocational Training, Micro-Industries, Social Entrepreneurship and Digital Services for Needy Women near Akurana in Central Sri Lanka. Lemonaid ChariTea Foundation.
- Enhancing Social Cohesion, Recovery and Resiliency of those Affected by the Kandy Mob Violence of March 2018 through improving community resiliency, engagement, and Use of ICT for Disaster Risk Reduction. USAID SCORE.
- The Project to demonstrate local level Disaster Risk Reduction in and Post-conflict Urbanizing Setting in Kandy with a focus on areas affected in March 2018 Disaster. Japan’s Grant Assistant for Grassroots Human Security Projects.
- Improved Planning, Design and Operations of Renewable Energy Systems through the use of Advanced Climate Science and Technology in Maldives and Sri Lanka. ISDB.
- Climate Science, Technology and Innovation for Risk Management and Adaptation of Agriculture, Fisheries, Disasters and Infectious Diseases in Comoros and Zanzibar. ISDB.
- Enhancing Reconciliation, Empowerment, Rule of Law for those Impacted and Vulnerable to Mob Violence. US Embassy.
- Advancing Air Pollution Monitoring Systems and Communication in Sri Lanka and Maldives and Assessing Impacts on Health and Environment in North- Western Sri Lanka. Techcamp Kathmandu - Small Grant.
- Promoting a more socially inclusive community through supporting impacted and vulnerable communities by episodic mob violence in Sri Lanka by enhancing their empowerment, building mutual respect among peoples of different cultural and religious identities and promotion of rule of law through reconciliation.

OPERATIONAL SERVICES (CLIMATE SERVICES)

Disseminated our weekly, monthly and annual climate assessments for Sri Lanka and Maldives by email and via social media. Dissemination of drought monitoring for Sri Lanka and Maldives and automated climate report generation for Maldives were continued.

- Climate Services for Sri Lanka: We continued to provide Climate Services for the Mahaweli Authority and Maldives. Archives of advisory reports are available at: <http://fectsl.blogspot.com>; Weekly expert input

for Hydro-meteorological Assessment for Mahaweli Authority is made available via <http://fectsl.blogspot.com>; <http://www.climate.lk> and <http://fectsl.wordpress.com>

- Climate Services for Maldives: Collaboration with the Maldivian Meteorological Services Monthly Hydro-meteorological Advisory services to Maldives. via <http://fectmv.blogspot.com> and <http://www.tropicalclimate.org/maldives>
- Climate Services for the Comoros: <http://www.tropicalclimate.org/comoros> provides updated information for the Comoros.

TRAINING AND STAFF

Ashara Nijamdeen, Tuan Hadgie and Fathima Shakira carried on from 2018.

Internship opportunities were provided for 19 students from University of Peradeniya, NIBM and Brihan Maharashtra College of Commerce.

WEBSITES, BLOGS, SOCIAL MEDIA AND MAILING LISTS FOR SRI LANKA

Websites

- We updated our website: <http://www.climate.lk>
- www.tropicalclimate.org was made serviceable.
- www.tropicalclimateguarantee.org was setup.
- www.recoverlanka.net and www.geolanka.net are not being maintained any longer and the content of recoverlanka is now online.

Blogs

1. Project Blogs (External):

Our projects each have a webpage which is accessible via www.climate.lk or www.tropicalclimate.org In addition, we maintained blogs for the following projects at

- MDP: <https://mdpsl.wordpress.com>
- AgMIP project: <https://agmipsl.wordpress.com>
- PEER: <https://peersl.wordpress.com>

2. Institutional Blogs (Internal):

- Blogs on Sri Lankan climate at: <http://srilankaclimate.wordpress.com> and <http://fectlk.blogspot.com>
- <http://fectsl.blogspot.com> is archived at www.kottu.org, a blog aggregator.
- <http://fectsl.wordpress.com/> has been updated regularly
- Tea & Climate in Sri Lanka: <https://teaclimate.blogspot.com>

3. Internal Blogs:

- FECT HR - <https://fecthr.blogspot.com>
- FECT Organizational Notes - <https://fectorg.blogspot.com>
- FECT Projects - <https://fectprojects.blogspot.com>
- Tropical Climate - <http://tropclim.blogspot.com>
- FECT IT - <https://fectit.blogspot.com>
- FECT Standard Operating Procedure - <https://fectsop.blogspot.com>
- FECT Publishing - <https://fectpub.blogspot.com>
- FECT Communication - <https://fectpub.blogspot.com>
- FECT Data Management -
- Data Library - <https://fectdl.blogspot.com>
- Disaster Services – Sri Lanka - <https://disasterlk.blogspot.com>
- Disaster Services Internal - <https://fectds.blogspot.com>
- Air Pollution and Atmospheric Chemistry -

Social Media

Twitter:

Our 3 Sri Lanka related twitter accounts have been somewhat active

- <https://twitter.com/fectlk>
- <https://twitter.com/climatelk>

Facebook: The visual presentation has been improved. However, we have not been active except for automatic postings

- <https://www.facebook.com/FACTSL>

Mailing Lists: Our mailing system has been maintained and we are sending our weekly climate newsletter. Subscription: Link is now listed at

<http://www.climate.lk/subscribe.html> Alternative short link: <http://eepurl.com/bPlixn>

MALDIVES - WEBSITES, SOCIAL MEDIA AND MAILING LISTS

We have maintained websites, social media and mailing lists for Maldives. Subscriptions for Maldives is included in <http://www.climate.lk/subscribe.html>

- **Websites:** <http://www.tropicalclimate.org/maldives>
www.climate.mv/ was setup for representing our work in the Maldives.
stem.climate.mv/ was setup as a resource for middle school students and their educators.
- **Blogs:** <http://fectsl.blogspot.com> and fectmv.blogspot.com are being regularly updated.
<https://maldivesclimate.wordpress.com>
- **Twitter:** <https://twitter.com/fectmv>
- **Facebook:** <http://facebook.com/fectmv>
- **Mailing List:** Subscription: <http://www.climate.lk/subscribe.html>
Alternative short link: <http://eepurl.com/bPkohP>

COMOROS - WEBSITES, SOCIAL MEDIA AND MAILING LISTS

Our websites, blog and twitter account for Comoros have been updated. Our main partner Hairu Fisheries in Comoros pulled out in large measure and as result we were stymied. We hope to work with Comorian partners.

- **Websites:** <http://www.tropicalclimate.org/comoros>
- **Blog:** <http://fectcomoros.blogspot.com>
- **Twitter:** <http://twitter.com/fectkm>

CHAGOS - WEBSITE, SOCIAL MEDIA AND MAILING LISTS

Our website and social media accounts for our work in Chagos have been updated. In the coming years, we shall make contact with Chagossians and those interested.

- **Website:** <http://tropicalclimate.org/chagos>
- **Blog:** <http://chagosclimate.wordpress.com>

ZANZIBAR - WEBSITE, SOCIAL MEDIA AND MAILING LISTS

We have set up a website and social media accounts for Zanzibar. In the future, we hope to work with our partners in Zanzibar.

- **Website:** <http://www.tropicalclimate.org/zanzibar>
- **Blog:** <http://fectza.blogspot.com>
- **Twitter:** <https://twitter.com/fectza>

DISASTER SERVICES – WEBSITE AND SOCIAL MEDIA

We have been updating and maintaining the website and social media accounts for our work on Disaster Services.

- **Website** - <https://disaster.lk>
<https://digana.disaster.lk/> was setup to present our work on the mob violence of 2018.
- **Twitter** - <https://twitter.com/disasterlk>
- **Facebook** - <https://www.facebook.com/disasterlk>
- **YouTube** - https://www.youtube.com/channel/UCvBg5N-R_Q7ksoHMP9Wp5dQ

INSTRUMENTATION

Weather Instruments

- We operated two automated weather stations (AWS) and made data available online. Weather data at our offices are taken every half an hour and uploaded automatically to the Internet for public access.
 - For Digana: http://tropicalclimate.org/digana_weather
 - For Akurana: <http://tropicalclimate.org/akuranaweather>
- Ambient Weather Stations were installed in Aranayaka, Norochcholai and Nawalapitiya.
- CCTV cameras were installed in the office in Narakkali.
- **Davis Weather Stations were installed in**

Air Quality Instruments

- Purple Air instruments were installed in Norochcholai, Illanthandiya, Puttalam, Nirmalpur, Nawalapitiya
- Air visual instruments were installed in Norochcholai, US Embassy, **LST**, Akurana, Puttalam, Kandy and in Serakkuliya.

Soil Moisture Instruments

A Soil moisture instrument was installed in the FECT office in Akurana and in the Observatory of the Maldivian Meteorological Service.

ADMINISTRATION AND IT (EXTENDED)

Financial management at Peoples Bank, Hatton National Bank and Commercial Bank has been without any issues. Our auditors, Anzari and Co. have once again certified our accounts to be up to standard and our Annual Reports have been submitted to Ralapanawe Associates, Colombo.

- Our libraries have been catalogued and are available digitally.
- Our paper holdings have been organized into a filing system to a large extent.
- These catalogues and other information are being made available via a staff internal website.
- Computer systems were maintained and upgraded to keep up with the additional staff. We have set up communication systems for remote interaction between our offices.
- FECT is registered in Comoros, Sri Lanka, Maldives and New York.

COLLABORATION

We had productive collaborations with personnel attached to the Mahaweli Authority of Sri Lanka (MASL), Ministry of Mahaweli Development and Environment, University of Peradeniya (UOP), Akurana Pradeshiya Sabhawa, Akurana Divisional Secretary, Akurana Women's Welfare Association, Open University of Sri Lanka (OUSL), Environment Committee of the Public Utilities Commission, Law and Society Trust and News View. In Maldives, we had productive collaborations with Maldives National University, Land and Marine Environment (LaMER) and the Small Island Research Group (SIRC/G).

ACKNOWLEDGEMENTS

We are thankful to Mr. S.R.K. Aruppola, Director Headworks (MASL), Deputy Directors, Eng. Jayasuriya and Hilal for much support in Digana Village. We thank the Water Management Secretariat for

collaboration. We thank Eng. Badra Nawarathna (MASL) of the Kotmale MASL office. We thank the staff of the HAO & M Maintenance Unit of the MASL for their support.

Our affiliate scientists, Neil Devadasan, Vidhura Ralapanawe, Ajith Gunaratne, Nalin Wickramanayake, Madhura Weerasekera and Manjula Siriwardhana continued to support us in numerous ways. Our alumni too have helped us from time to time. Raashid Zubair has been advising on managing our audio and video content.

In Maldives, we thank Dr. Shazla Mohamed (Dean/Science Faculty, MNU), Dr. Mizna Mohamed (MNU lecturer), Shaadiya (MNU lecturer), Dr. Naseer (MNU), Mr. Waheed (DG-MMS), Zahid (DDG -MMS), Muaz (Engineer - MMS) and Wahid (DG-MMS), Aslam (Director - LaMER), Hussein (Scientist – LaMER), Dr. Shiham Adam (Director Marine Research Center), Ms. Hudha Ahmed (Renewable Energy Maldives), Majeeda Mohamed (Ministry of Environment) and Nishan Ahmed (Ministry of Health).

At Columbia University, we thank Profs. Adam Sobel, Upmanu Lall, Dr. Bradfield Lyon for supporting us in various ways.

We thank Michael Bell and Remi Cousins of the IRI for their support in numerous ways in relation to the IRI data library. We thank Dalal Najib, Daniel Placht, and Kelly Robbins of National Academy of Sciences, who has been supporting us with the PEER projects. The USAID officials Nihani Riza and Margot Welk and others have helped.

We also thank Mr. S.M. Nawas (South-Eastern University), Prof. Jude Fernando, and Mr. Irfan Cader for their support and contributions towards our work related to Disaster Services.