Building *Capability*

ANNUAL RESEARCH REPORT 2014–2015

ދިވެހިރާއްޖޭގެ ޤައުމީ ޔونިވަރސިޓީ
The Maldives National University

There are almost no grant-awarding public institutions in the Maldives. For this reason, from 2014, the university began making grants to stimulate research within the university. Many staff availed themselves of this opportunity.

Research Report 2014/2015 Theme: Building research capability

Contents

Research & Innovation

It is a pleasure to welcome you to the Research Centre of The Maldives National University. We strive to conduct research of highest quality and develop excellent staff. We also collaborate with other institutions and organisations to do research and enhance evidence based decision making in the university and the country.

Our vision is to increase the University ranking through high quality research output by staff and students. To facilitate this, the Research Centre supports the engagement of staff and students in research from several disciplines including science, education, health, information technology, engineering, psychology, language and others.

In the past two years, the staff of The Maldives National University have been undertaking several high quality research. The Maldives National University has awarded researchers more than MVR 4,000,000/- worth of grant money in the years 2014 and 2015 to facilitate such research.

Our goal is to build an academic staff community who are passionate about research and are actively involved in publishing.

This research report brings into focus a 'snapshot' of research undataken by staff of MNU in 2014 and 2015.

Raheema Abdul Raheem, PhD
Dean of Research

String *and* micro-inverter PV systems

Muaviyath Mohamed, did doctoral studies in energy (both conventional and renewable). He is the former Dean of the Faculty of Engineering Technology, and now the Deputy Vice-Chancellor at the Maldives National University (MNU). His research background falls mainly in the following areas: (a) Renewable and Sustainable Energy for remote areas; (b) Energy dependency and quality of life; (c) Energy conservation and efficiency and (c) Structural fatigue failure issues (modeling and simulations).
This research project involves the comparative study of two types of photovoltaic (PV) power generation systems installed in atoll campus(es) to assess their impact on electricity bills, and to evaluate their technical performance. One system of 10 kW has been installed on a building in Hithadhoo Campus and used string-type inverter. Another 10 kW PV system will be installed on a similar building in a close proximity but will use microinverters and will be rated at the same power.

The research involves mainly four steps: (a) specifying the PV system, (b) procurement and installation of the system, (c) monitoring the performance of the system, and (d) disseminating the results.

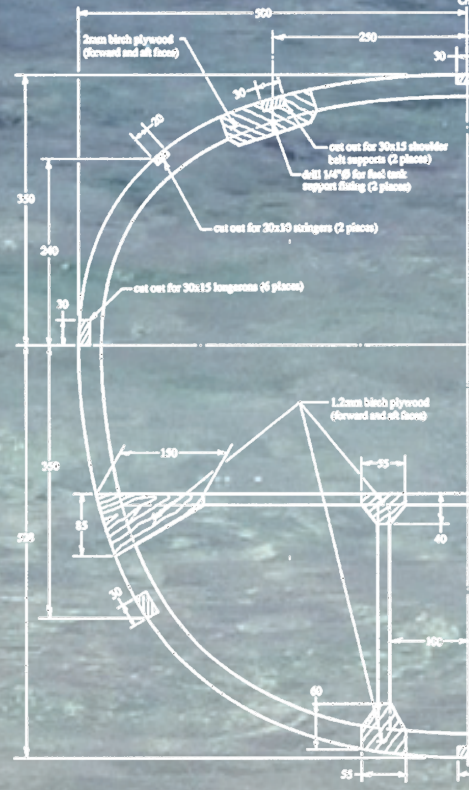
One 10 kW PV string inverter system installed in Hithadhoo Campus New Block. This is a three story building purposefully made for energy conservation with necessary facilities for PV on roof. Another system with same specification will be installed except that the inverters will be microinverters to the required power of 10 kW. The system will be installed in a similar building.

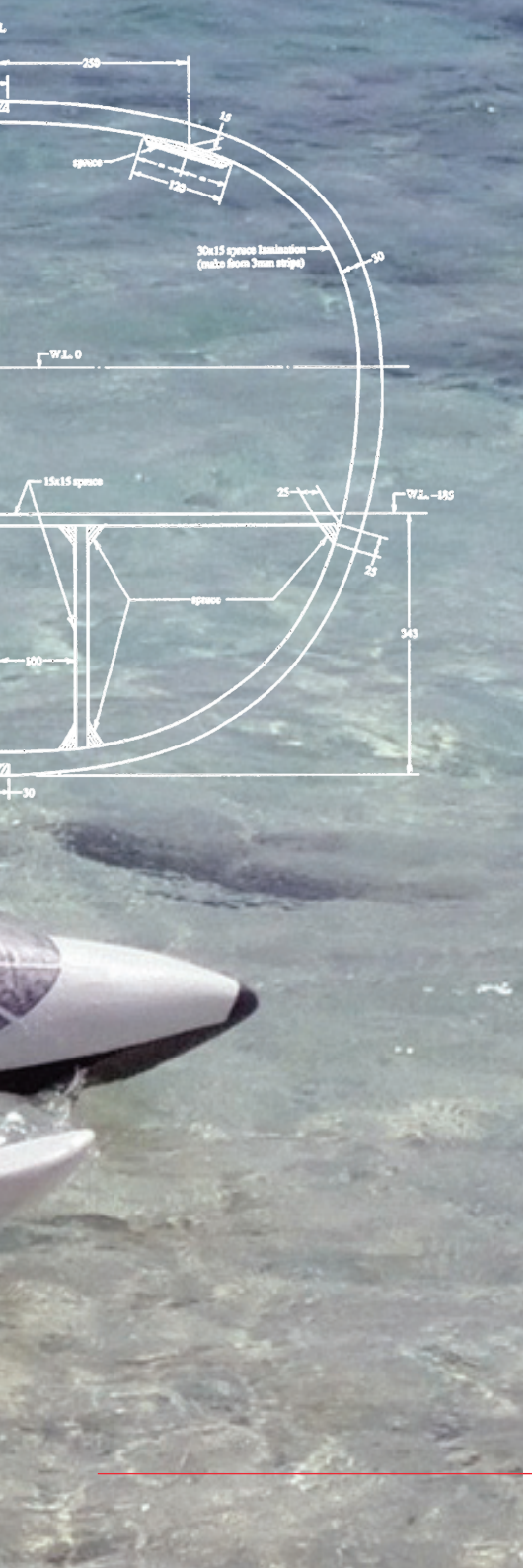
'I plan to do further research on installing and taking performance measurements of a similar PV system with microinverters for comparative studies and determine the impact of geographical and atmospheric changes in performance of the two types of inverters.'

This comparative study of equal power string and micro- inverter systems is novel and unique. The project will support Government's drive to increase the penetration of PV in electricity generation at the same time contributing to reduce greenhouse gases and recurrent costs of the campus(es). The project will also improve the technical know-how and performance evaluation of PV systems within the country. Significantly, the project will be a laboratory for staff and students to gain experience in a sizable PV installation.

The results indicate that the installed PV system is promising, reliable, and satisfactory for the Maldives. Long-term performance studies for Maldives are almost non-existent for the country. Emerging popularity of microinverters and technically advanced inverters are likely to increase the penetration of PV systems. In large islands, the penetration will be limited due to effects of, shading, clouds and other intermittent causes.

Project Title: Comparative performance of string and micro-inverter based 10 kW PV systems.
Grant value: MVR 1,000,000


320
250
3mm birch plywood
(forward and aft faces)
30
30
cut out for 30x15 shoulder
bolt supports (2 places)
drill 1/4"Ø for fuel tank
support fixing (2 places)
cut out for 30x15 stringers (2 places)
330
240
cut out for 30x15 longerons (6 places)
30
1.2mm birch plywood
(forward and aft faces)
150
55
250
85
40
328
30
100
40
55



Testing a Lippisch reverse delta WIG Craft

A 4-seat Wing in Ground effect craft was designed informed by an extensive literature review of past efforts in WIG craft engineering. Several designs were considered during concept evolution. The review identified a reverse delta configuration as best meeting the design requirements. A one-fifth scale of the aircraft was modeled using blue polystyrene foam and flown using an electric motor in pusher configuration. The results of the testing indicated that the design is sound and the flight stable. A key consideration for effective flight is undercambered airfoils to reduce take-off distance.

Testing was carried out in the lagoon on the Eastern side of Vilin'gili—an island close to Male', the capital island. Tests were also carried out in the inner harbour of Male' which is sheltered from larger waves by a breakwater. In some instances, a GoPro camera was mounted on the tail to observe flying characteristics.

This project has two main purposes. One was to gather the significant engineering information on Lippisch-type WIG craft through a literature review. The second purpose was to design and test a one-sixth size model of a four-seat WIG craft using the principles that had been used in the design of previous WIG craft.

The purpose of building and testing a model is to locate as many issues as possible before building a full-scale model. It is difficult to optimize the parameters for the model because so many variables are interdependent. The hull design principles were validated by the testing. However, in future testing the thrust line of the craft and the wing's angle of attack may be made easily variable so that the optimum angle can be found.

> "Research that enhances the lives and livelihoods of the masses is what counts in the end. Any technology that overcomes the tyranny of distance of these dispersed islands will have a major impact on people."

Different methods may be tested to reduce take-off run such as the use of air bubbles to decrease hydrodynamic drag and boundary layer control methods. If the WIG is to be commercially successful, a shorter take-off run is essential.

Project Title: The design of a 4-seat reverse delta Lippisch WIG craft — model testing
Grant value: MVR 19,000
Utilized: MVR 10,000

Community engagement

The research team was led by Shazla Mohamed who is currently the Dean of the Faculty of Science. She has completed Doctor of Philosophy in Food Technology from Massey University, New Zealand. Shazla's research interest is mainly focused on food safety and quality specifically on the microbiological and chemical safety of foods. Agricultural enthusiast Hussain Haleem, the former Deputy Vice-Chancellor of MNU was also actively involved in the research.

There is need to expand the agriculture sector of the country to sustain food security and reduce reliance on imports by fostering collective development of the sector. This project will initiate university extension services to farming communities in the country for supporting local food production including supply of high quality fresh harvest.

The main objective of this project was to set up a model hydroponics system for growth of capsicum. The project intended to optimize the technique for growth of this crop in the Maldives and compare different settings for capsicum production utilizing greenhouse hydroponics (2 different substrates), greenhouse soil and outdoor field cropping. In additional community engagement was emphasized by training local farmers on hands-on approach to grow capsicum using hydroponics.

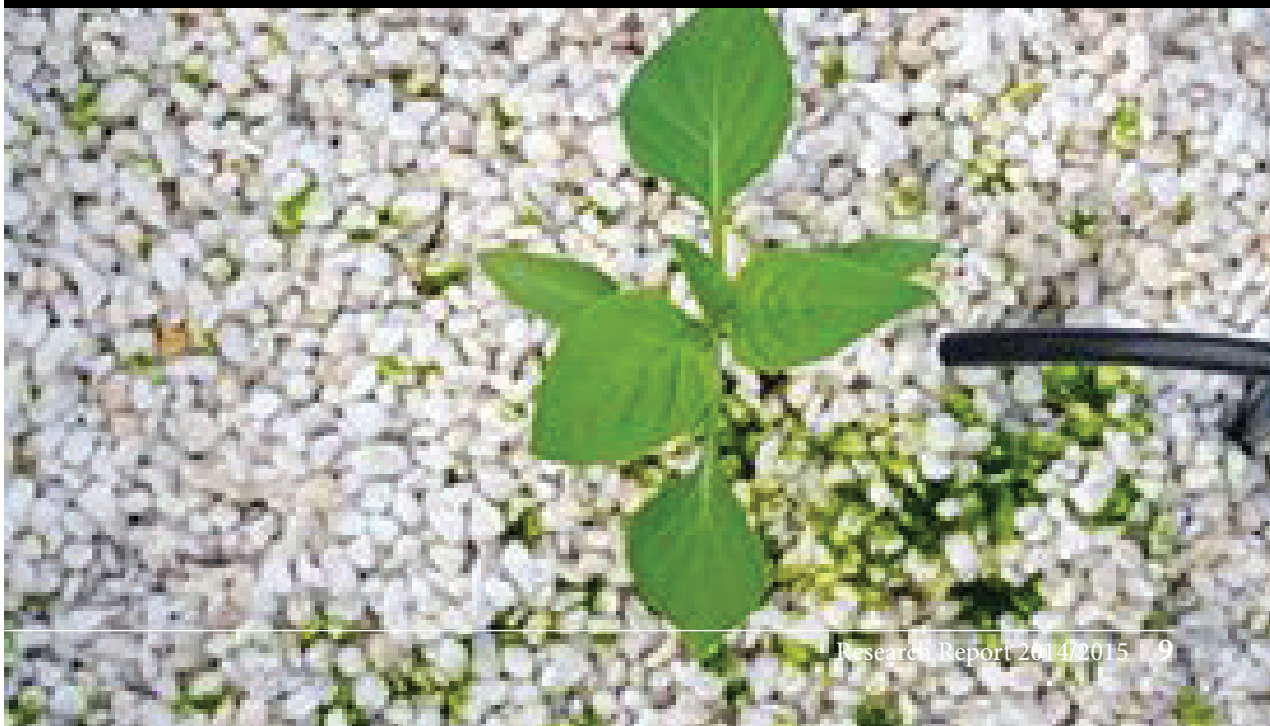
A green house of 6m x 15m was set-up to analyze variations of growing bell pepper in green house and in an open field. Perlite (perlite contained in poly grow bags) and coconut fiber hydroponic drip systems were installed inside and outside the greenhouse. Commercial hybrid sweet bell pepper seed (F1 varieties) adapted to warm climate cropping was used. Data was collected during trials for plant height and appearance, pest and diseases and yield which were compared between the treatments.

'Capsicum is a highly marketable crop in the country but is always imported. Although our climatic conditions are ideal for this crop that grows remarkably well in hydroponic settings, only minimal trials have been conducted so far.'

The research shows that capsicum production is optimal under the treatment "Greenhouse based hydroponics – Horticultural grade coconut fiber substrate". Data analysis is still ongoing.

In future research other treatments and settings would be considered such as altering the green house design and use of locally sourced coconut fiber as substrate to optimize the production.

Project Title: Pilot study of hydroponics capsicum production at Laamu Gamu
Grant value: MVR 750,000




THE HINDU SPEAKS
English Literature
Global Culture
Globalization and Culture
PARLIAMENTARY HANDBOOK
Handbook for Journalists
EINSTEIN

Caught *between* cultures

The research team for the project was led by Naashia Mohamed, with Aminath Zahir and Waleedha Eysa contributing as co-investigators.

Naashia Mohamed is Senior Lecturer and Head of the Department of Linguistics at the Faculty of Arts. She has conducted several studies on the intersections of language, society and education. Her current research interests relate to the areas of bilingualism, language education and language policy. Aminath Zahir is Lecturer and Head of the Department of Dhivehi Language at the Faculty of Arts. Her research interests relate to Dhivehi grammar and Maldivian history. Waleedha Eysa is a Lecturer in Linguistics at the Faculty of Arts. Her areas of expertise include phonetics and phonology of the Dhivehi language.

This study draws from the area of ethnolinguistic vitality. The study utilized a sequential mixed methods design. The three methods of data collection used were survey, narrative task and in-depth interviews. The survey data was analysed through descriptive and interpretive statistics, using SPSS. The qualitative data from the narrative task and interviews were manually coded and grouped into themes.

While a considerable proportion of the participants associated themselves more with an English-speaking global community – and as a result, actively distanced themselves from their Maldivian identity – the study revealed that the majority of Maldivian adolescents have hybrid identities. Most adolescents appeared torn between the two communities. While on the one hand, they recognized that the English language opened up opportunities for education, employment and a better future, they seemed obliged to state that the Dhivehi language and the Maldivian culture were their heritage.

"Conflicts between their stated identity and their reported behavior led us to conclude that the Anglo-centric system of education has been harmful to balanced bilingual identity development and that focused attention on building positive bilingual identities is urgently needed to help young people value their own culture and language."

This study is significant due to the following reasons:

- Descriptions of Maldivian culture often refer to the people of this archipelago as sharing one language, one religion and one culture, emphasizing a strong sense of group identity among us. However, over the years, the country has evolved from a monolingual one to a bilingual one, with the English language threatening to overshadow the local language in many domains.
- Looking beyond the language, there are signs of radical cultural change within the society. These changes, have touched the heads and hearts of most people, even affecting some of their core beliefs and values.
- Studies suggest that the transitional period of adolescence is when self-categorization is most recurrent and identity development is at its peak.

This study examines how young people perceive themselves and if they have adopted bilingual and bicultural identities as a result of globalization.

Naashia is interested in further examining the specific factors that lead to identity development in detail to assess how and the extent to which each of these contribute to the formation of our identities. She is also keen to examine the issue from a language policy perspective, considering how Dhivehi language planning efforts could raise the prestige and vitality of the language.

Project Title: Bilingual and Bicultural Identity Development in Adolescents
Grant value: MVR 100,000
Utilized: MVR 74,533.95

Bridging *the* Gap

Roza Ibrahim is a dynamic, higher education professional, currently leading and coordinating higher education courses at the Centre for Open Learning (COL), MNU. With a Master Degree in Higher Education (E-learning) she has a keen interest in research in the area of blended learning and E-learning.

With flexibility, accessibility and collaboration, blended learning has bridged the gap to provide higher education opportunities for the geographically dispersed population in the Maldives.

The demand for this mode of learning is increasing world-wide due to its flexibility, accessibility, collaboration and interaction. The same trend can be clearly seen from the increasing numbers of students for COLs courses from 2009.

In her research titled 'What are graduates perspectives on blended learning in the Maldives?' Roza explored students' perspectives, their opinion and motivations about the blended learning environment at COL. According to her and many other researchers this type of research is crucial in order to meet students' expectations, hence, Roza believes that the findings of the study can benefit COL in developing this novel learning environment further. The main focus of Roza's research is on content, face-to-face tutorials sessions and GEM; the learning management system built on MOODLE. The study also examined the underlying reasons for students choosing blended mode courses for their studies.

This research is quite significant to Maldives as similar studies have not been conducted in Maldives before. In addition, this type of research is vital for further development of blended learning.

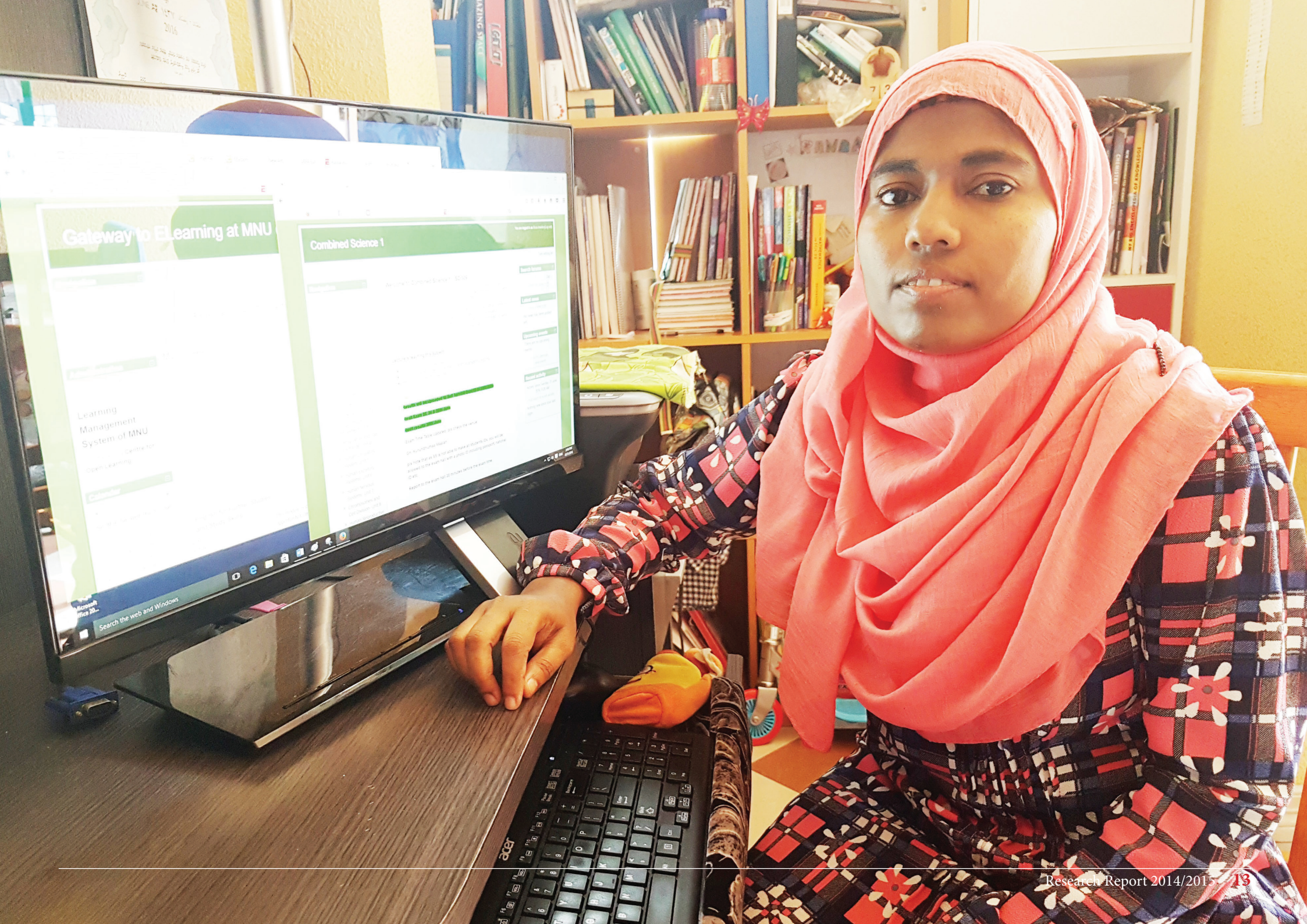
The results of Roza's research shows that students choose courses offered by blended mode for the flexibility and convenience it offers, the possibility of staying with family while studying, the possibility of doing a full-time job while studying and the excitement of self-directed learning. According to Roza, in blended learning, learning resources or learning materials play a crucial role as students interact with the learning materials online and off line. Most participants of her study acknowledged that the study guides provided the required information covering major areas. They were appropriate well-structured and beneficial.

The face-to-face tutorials sessions were conducted as block sessions mainly ten hours of lecture and tutorials from every module. Some participants of Roza's study expressed that they enjoyed tutorial sessions and they were effective and encouraging. In addition, they believe that the face-to-face sessions gave them the opportunity to share their experiences with peers from different backgrounds.

"COL has established this novel learning environment; blended learning in 2009. The main reason for this adaptation is to bridge the gap and provide higher education opportunities for the geographically dispersed population in the Maldives.."

The challenges participants of Roza's study highlighted include the block sessions being too intensive for weekends and students feeling exhausted at the end of the sessions.

Project Title: Student's satisfaction on blended learning at Centre for Open Learning, The Maldives National University
Grant value: MVR 50,000


Gateway to ELearning at MNU
Combined Science 1
Learning
Management
System of MNU
Search the web and Windows
acer

Push *and* Pull

This research was led by Aishath Shanoora of Faculty of Arts. The research team includes, Fathimath Shougy, Mariyam Fizana Rashyd and Wadheea Thoufeeq of Faculty of Education. This is an enthusiastic team of educational professionals from different fields and have diverse research interests. Aishath Shanoora has a keen interest to explore causes and interventions for depression anxiety and stress. Fathmath Shougee's interest lies around career choice while Wadheea Thoufeeq is fascinated about impacts of teaching and learning of science on student's science literacy. Fizana Rashyd's interests lie around social issues related to education. Despite the differences in their research interests, they share a common interest for research in education.

The research team has completed their study "Push and Pull Factors of tertiary institutions of Maldives" and disseminated the findings at an international conference "6th International Conference on Teaching, Education and Learning (ICTEL), Singapore" in November 2015. In addition, the team has contributed to a number of research projects at Institute of Research and Innovation in Villa College; "Risk of Violence to Maldivian Children Deprived of their Liberty", "Assessment of Family Planning Policy Implementation" and "Socio-economic and religious factors that influence contraceptive use".

A study on the push and pull factors of both Maldivian institutes and overseas institutes are important for several reasons. Firstly, understanding the factors that contribute toward interest for higher education will provide insight into ways of increasing the percentage of school leavers continuing to tertiary education. The finding of the study would also be important for tertiary education providers in Maldives as the results would identify the significant factors that influence students' college choice. For a developing country like Maldives, it is important to identify the number of students' interested in higher education, the areas that interest them, the factors that influence these interests and pull and push factors influencing their choice for overseas institutions.

A quantitative survey using a self-administered questionnaire was used in this research. It used multistage cluster sampling for data collection. Maldives was divided into three main clusters; Male', Atolls with access to tertiary education campuses, atolls without access to tertiary education campuses. A sample of 1000 students was randomly (random classes) selected. Data was collected from junior secondary, senior secondary and university/college students.

It was found that 91.6% students are either attending or planning to attend university in the future. A very high percentage of students want to continue to higher education. From the list of reasons provided, developing oneself (98%) is the highest rated and making money (73%) was the lowest rating. 28% of students were interested in studying health sciences, 20% in studying business, marketing and management and 18% showed interest in studying education.

Parental income was measured by using fathers' income. Business studies (36%) were the interest areas for the highest percentage of students from high income fathers which was followed by health sciences (33%). Regardless of the interest area a high percentage of students showed interest for going for overseas education.

Interest for undertaking their higher education is highest for interest areas skills and technical services (94%) sciences and technology (93%) and Shari'a and Law (90%). Lowest percentage of interest for overseas education was shown by students interested in studying Education (73%) and Islamic studies (75%)

41.6% preferred to study in East Asian countries, 38% of the students preferred Australia, 34.8% of the students' preferred western European countries. The least preferred region was Eastern European countries. The most influential factors for choosing a higher education institution were 'self' (M=3.51), parents, (M=3.22) and family members (M=3.11). The lowest were for school counselors (M=1.95) and teachers (M=2.42).

Further research could be done on understanding reasons for choosing different disciplines for higher education.

Project Title: Push and Pull Factors of tertiary institutions of Maldives
Grant value: MVR 218,000
Utilized: MVR 129,334.46

Valuing mangroves

Fathmath Shadiya (Lecturer, Faculty of Science) led this research together with Aminath Shazly (Lecturer, Faculty of Science) and Ahmed Riyaz Jauhary (Senior Scientific Officer, Marine Research Centre). The project was funded by UNDP under the Mangrove for the Future program. With Master level qualifications, the environmental enthusiasts have been actively doing research in the field for a number of years both individually and as a team.

Mangroves are highly productive ecosystems which provide food, shelter and many ecological services such as carbon sequestration, protection against storms, hurricanes, and floods prevention of coastal erosions and regulation of water. Despite numerous ecological roles played by mangroves, most Maldivian communities do not appreciate mangroves; as a result, many mangroves are subjected to habitat destruction and habitat modification.

Biodiversity assessment carried out in this project will shed some light into the flora and fauna present in Huraa mangrove. The Valuation study will help researchers to estimate the worth of Huraa mangrove in terms of monetary value. For conservation of threatened habitats such as Huraa Mangrove, biodiversity assessment and valuation studies are needed to make informed decisions by policy makers.

The results of Vegetation study showed that among the four, vegetation species found in Huraa, Kandoo (Bruguiera Cylindrica) was found to be the most common species while Randoo (Rhizophora mucronata) was found to be the least common. Bodavaki were distributed throughout the mangrove, but with majority of its mature trees being located in northeast and southeast of the mangrove. Randoo, the least in number is sparsely distributed on northeast, southeast and southwest of the mangrove and appears to be concentrated on the northeast side towards the central part of the mangroves water body.

Results of the abiotic study showed that, the average pH of soil at the shoreline of the mangrove was at 7.2 while at inland the average pH was at 7.5. At the mangrove where Randoo is most abundant, the pH was slightly alkaline at 7.84. In Huraa mangrove, many crabs were seen on the mangrove floor during low tide. They all have a very important role in the mangrove ecosystems and are a rich source of food for birds and fish that frequently visit the mangrove.

The method applied to study valuation of Huraa mangrove was market price method. Market price method is used to estimate the economic value of the ecosystem in terms of ecosystem products that can be bought and sold in commercial markets. From the interview session it was found that, at present, there is a growing market for giant mangrove crabs by the Chinese tourists who visit the island. Kandoo logs with the diameter more than 9 inches can still be sold in the market for MVR 500 to build boats. Black tip baby reef sharks which are often spotted in Huraa mangrove also have a market of $250. Annually on average, 50 field trips are conducted to Huraa by schools from Capital city. In such trips, each student spend about $10 as field trip fees to visit the island.

In summary it can be said that the value of Huraa mangrove based on the market price of the few species taken in to account, can be equivalent to $644,707 (Six hundred and forty four thousand seven hundred and seven). When converted to Maldivian Ruffiya this amount is equivalent to MVR 9,941382 (Nine hundred and forty one thousand, three hundred and eighty two).

Social research findings suggest that local community does not have a clear idea of the current protected area model and they feel that they are excluded from their own natural resources. An inclusive participatory model where economic, social, and environment dimensions are considered is very much needed to ensure future sustainability of Huraa mangrove.

Project Title: Environment Valuation of Huraa mangrove
This project was wholly funded by UNDP for $ 25,000


DISSEMINATION
ENVIRONMENTAL
A case study of

Research Output 2014/2015

Research Center

Publications

Raheem, RA., Binns, C. W., Chih, H. J., & Sauer, K. (2014). Determinants of the introduction of prelacteal feeds in the Maldives. *Breastfeeding Medicine , 9*(9), 473 - 478.

Faculty of Arts

Authored Book

Mohamed, N. (2014) The challenge of medium of instruction: a view from Maldivian schools. In Hamid, O., Nguyen, H. and Baldauf, R. (Eds.). Language Planning for Medium of Instruction in Asia. Routledge.

Conference Contribution

Ali, A.R. (2014) *Building Collaborative Partnerships: exploring the opportunities*, Yunnan Open University, Kunming, China: the 9th China - South Asia Business forum: Education Sub Forum. Nov 2014.

Ali, A.R. (2015) *The Evolution of Maldivian National identity: Political and Folklore* Approach, Institute for Defense Studies and Analysis, New Delhi, India: the 9th International Conference on South Asia, Nov 2015.

Mohamed, N. (2014) *Bilingual children's language use and linguistic identity: Home contributions and family language policy*, Brisbane, Australia: The AILA World Congress, 10-15 Aug 2014.

Mohamed, N. (2015). *Bilingual and bicultural identity development in adolescents*, Hong Kong: CAES International Conference: Faces of English: Theory, Practice and Pedagogy, 11-13 Jun 2015. Rasheed, A, A. (2015) *Constructivist's International Political Economy of Trade: The BCIM Initiative as a Way Forward to China-South Asia Relations,* China - the BCIM Meeting, 14-15 Jun 2015.

Rasheed, A, A. (2015) *China-South Asia in a Resilient Cooperative Proximity: Constructivist Institutionalism and International Political Economy of Trade,* Kunming, China: The 3rd Conference of China-South Asian Think-Tank Forum (CSATTF), 12-13 Jun 2015.

Publications

Afeef, A. (2015). *Dhivehi Bahuge lafuzuge ilmuge therein lafuzu furolhun (derivation).* Male': Dhivehi bahuge Academy.

Ibrahim, A. (2014). Dhivehibahuge kurimagu. *Faithoora, 416,* 25-28.

Ibrahim, A. (2015). Bahuruvathakaamedhu dhekeygoi. *Faithoora, 421*, 25-28.

Ibrahim, A. (2015). Bulhalaamedhu dhekey goithakaai heethah gaboolukurevey heyyeve? *Faithoora, 426*, 25-28.

Mohamed, N. (2014). The impact of theory and research on three ESL teachers' beliefs and practices. *The Maldives National Journal of Research, 2*(1), 48-61.

Maxwell, T.W., Mohamed, M., Mohamed, N., Naseer, B., Nasheeda, A., & Zahir, A. (2015). Becoming and being academic women: Perspectives from the Maldives. *Cogent Education, 2.*

Rasheed, A. R. (2014). Historical institutionalism in the Maldives: A case of governance failure. *The Maldives National Journal of Research, 2*(1), 7-28.

Rasheed, A. R. (2015). Development, development policy and governance in the Maldives: A political economy perspective. T*he Maldives National Journal of Research, 3*(1), 29-51.

Zahir, A. (2015). Tense and aspect in Dhivehi Language: A linguistics analysis. *The Maldives National Journal of Research, 2*(1), 76-96.

Faculty of Science

Authored Book

Chaudhuri, S. (2015). Application of Web-based Geographic Information System (GIS). In e-Business, Handbook of Research on Promotional Strategies and Consumer Influence in the Service Sector. USA: IGI Global.

Faculty of Shari'ah & Law

Conference Contribution

Qazi, B.Z. (2014) *Sexual harassment law in India: Thus far and further*, IIUM, Malaysia: The International Conference on Law and Order and Criminal Justice, 19-20 Nov 2014.

Publications

Qazi, B. Z. (2015). Sexual harassment law in India: Thus far and further. *Amity International Journal of Juridical Sciences, 1.*

Qazi, B.Z., Waheedha, F. (2014) *Reflections on the new penal code of Maldives*, IIUM, Malaysia: The International Conference on Law and Order and Criminal Justice, 19-20 Nov 2014.

Center for Open Learning

Conference Contribution

Ibrahim, R. (2014) *Blended Learning: Learning in the 21st Century*, Villa College, Male', Maldives: The 2nd International Teachers Conference. 08-10 Sept 2014.

]Ibrahim, R. (2015) *Blended Learning: A case study of Innovation in Higher Education in the Maldives*, Hans Raj College, New Delhi, India: International Conference in Innovating Education in Asia. 31st Oct-02 Nov 2015.

Ibrahim, R. (2015) *Student satisfaction on Blended Learning*, NIE & Villa College, Male', Maldives: 3rd International Teachers Conference. 01- 02 Sept 2015.

Project reports compiled based on the named researchers reports. Published by the Research Center of The Maldives National University. December 2016.

Research & Innovation

The Centre was established in 2013 as the Postgraduate Research Centre with the primary aim of promoting and supporting research within the University. In 2014, the Univeristy Council began granting research funds on submission of proposals. The funds were allocated from the revenue generated by MNU. This booklet summarizes the progress of some projects completed or underway. In addition, the booklet includes a project completed with the help of an external grant. For more information on the activities of the Research Centre, please call: 3345420.