

Core Human Resource Development for Road Asset Management Program

RAMP

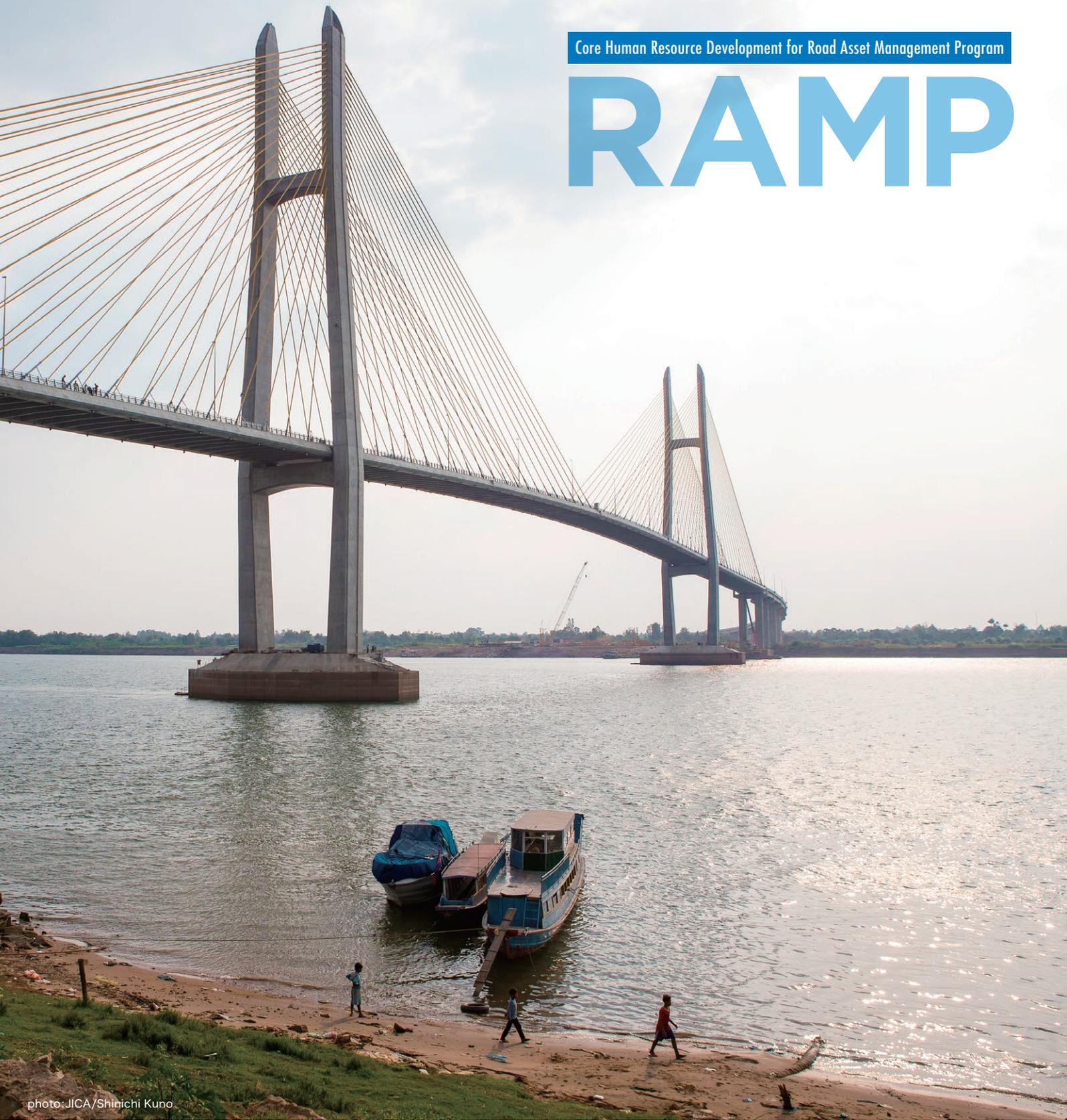


photo: JICA/Shinichi Kuno



RAMP - to connect the world

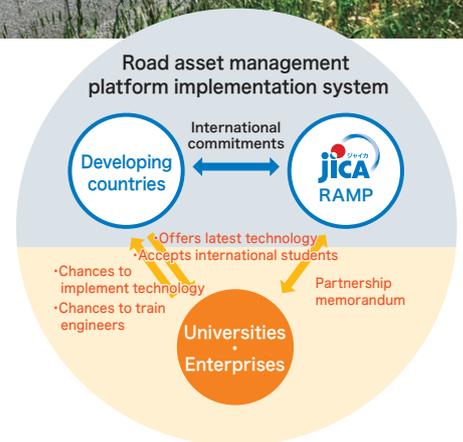


Road asset management is the practice of appropriately understanding the condition of road assets such as roadways and bridges, making estimates on their degradation and damage, and conducting repair and reinforcement work during the appropriate periods in order to lengthen the life of those assets and realize maintenance plans that aim to minimize life cycle costs. In October of 2017, JICA established the Road Asset Management Platform (RAMP) with the purposes of formulating a plan to efficiently support road asset management that is thought to increase in demand from here on in developing countries, supporting the global expansion of Japanese technologies related to road asset management, and training core personnel to lead in the field of road asset management in developing countries.



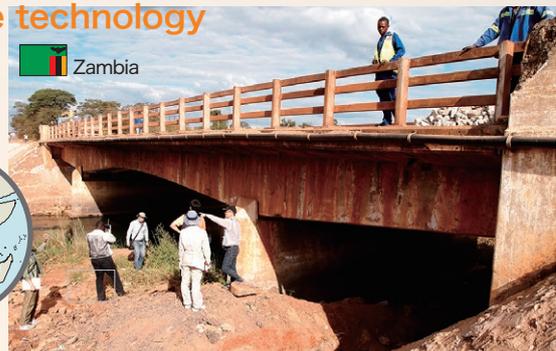
Features of the platform

- Uniformly and comprehensively covers various efforts within Japan related to road asset management and is able to flexibly handle the issues of developing countries.
- Consolidates previous technical support projects and simplifies the approaches to each level and the building of recommendation models.
- Trains personnel to lead in the same fields in developing countries and creates opportunities for mutual technology expansion and building a network of connections.
- Through cooperation with the Japan Society of Civil Engineers, the Society's world-class technologies and knowledge regarding lengthening infrastructure lifespans and asset management can be utilized in the support of developing countries.



Connecting the world with cutting-edge technology

In Zambia, there was a need for more sustained training of bridge engineers. In response to this, the “Maintenance Expert Training Course”, a training program for bridge engineers run by Gifu University in Japan, was introduced and a sustainable engineer training system is now being established with the University of Zambia playing a central role.



In Laos, institutions that manage road infrastructure are currently suffering shortages of labor and technology.

Through a technical cooperation project, experts from industry, academia and the government will be delegated and leading technologies from Japan will be utilized to work on solving onsite technical problems and sustainably training personnel. They will further aim to promote innovation from Japanese companies and universities and advance overseas business expansion.

What is the Core Human Resource Development for Road Asset Management Program?

The Core Human Resource Development for Road Asset Management Program aims to strategically train personnel tasked with the role of establishing road asset management in developing countries. It is a long-term training program run as a part of the RAMP project.

Each participants are expected to master knowledge and technologies involved with road asset management at graduate schools in Japan. The program also aims to promote understanding of Japanese technologies and personal networking with Japanese policy makers and researchers, through the introduction of Japanese initiatives and human resource development methods. By doing this, the project trains personnel to be the core in their fields in the future and contributes to policy making and implementation for establishing road asset management in their own country.



Target participants

- Current administrators or technical officers who govern roads (maintain road-related laws, formulate road policies, allocate road budgets, manage road projects, etc.) or manage road operations in the government of a developing country
- Current educators or educator candidates at a university in a field related to road asset management (soil mechanics, concrete technology, steel structural engineering, etc.) in a developing country

Program content

- Enrollment in Master's degree course / Doctorate degree course
- Visit to Japanese local governments, highway companies, research institutes and private companies.
- Participation in JICA's various training programs in the fields of roads and bridges
- Internship at Japanese private companies



Program Outline

《Preparation》

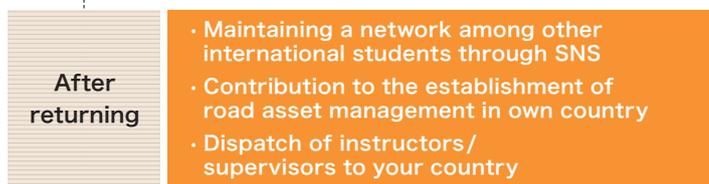
■ JICA ■ Universities in Japan



《Arrival in Japan in Spring》



《Return to country》



Accepted number of participants per year and per country

Country	Enrollment Year (JFY)		
	2018	2019	2020
Laos	3		
Cambodia	1		
Indonesia			
Philippines		2	1
Myanmar			2
Mongolia		1	
Bhutan			4
Nepal			
Bangladesh		1	
Pakistan			2
Kyrgyzstan			1
Kenya			3
Ethiopia			1
Zambia			
Ghana			
Madagascar			
Egypt		1	
Chile			1
El Salvador			
Total	4	5	15

(As of December 2020)

Expectations for participants

This program offers the chance to research road asset management at a Japanese university. Additionally, it is not only a research opportunity but also a chance to learn about the work involved in establishing road asset management in Japan and the technologies developed by private companies and research institutions as well as an opportunity to participate in an internship program at a private company or research institution. When the participants return to their home country, it is hoped that they will substantially use the knowledge and techniques they acquired through this program and their built-up human network of Japanese academic intellectuals and private companies to play a central role in establishing road asset management and, in reference to Japan's initiatives, promote industry-government-academia partnerships in their countries. In order to establish road asset management in line with the actual situations of each country, the cooperation of industry, academia and government is necessary. By having all three parties collaborate

Director of Team 1, Transportation Group,
Infrastructure Management Department, JICA



Mr. Tomoki Kanenawa

– the government managing maintenance, private companies offering technology, and universities researching and developing – a sustainable road asset management system can be built. Participants are expected to play not only the role of connecting Japan with a developing country, but also that of a key person in connecting government, private companies and universities in the area of road asset management. During the international student program, the participants will also have some opportunities to meet and exchange with road asset management long-term trainees from other countries. Along with acquiring knowledge on the circumstances and issues involved in these other countries, please also take the effort to continue making contact with each other after returning to your respective countries and encourage each other to solve the issues in your countries.

Special program

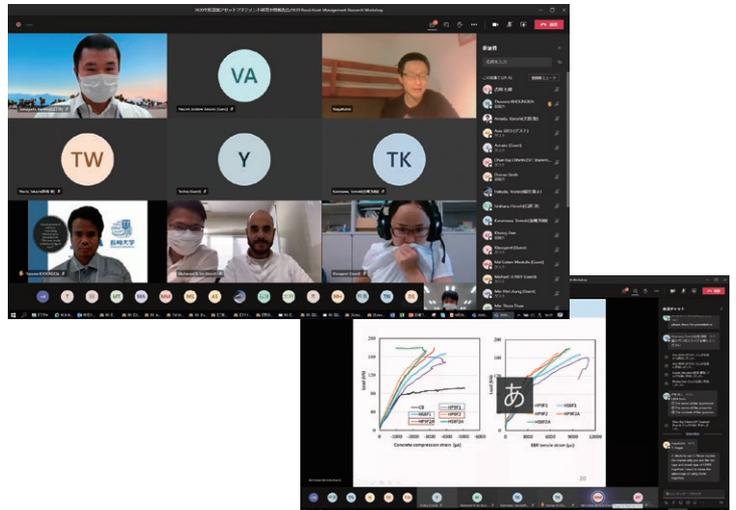
A special program for participants will be held during the university summer vacation period with the aim of further deepening understanding of road asset management. Trainees who participated in the 2019 program gave feedback such as "I want to also participate in next year's program so as to further acquire knowledge about road asset management" and "having seen the inspection demo that used Japanese technology, I wish to implement new technologies into my own country too", and a survey conducted afterwards also evaluated the program highly. The program is scheduled to continue to be implemented in the future.



Midterm report

On September 29, 2020 (Tuesday), a research midterm report presentation was conducted by six international students currently studying at a university in Japan. This year, as the coronavirus pandemic made it difficult to conduct training and present the reports in person, the presentation was conducted online.

The audience consisted of international students who were scheduled to come to Japan and study in Japanese universities in the Japanese fiscal year of 2020 as well as the superiors of international students currently enrolled in the program, and a meaningful discussion took place about the research and activities being carried out in Japan.



Internships

There are opportunities for participating in internships for international students wishing to do so. These internships have the right three objectives:

With the impact of the coronavirus pandemic, as of December 2020 internships are yet to be implemented, however they are scheduled to be conducted in future as they become available. Moreover, they will be conducted during a period that doesn't interfere with schoolwork and that is at shortest three days and at longest one month.

- 1 Deepen understanding of Japan's latest outstanding technologies and initiatives related to roads through work experience
- 2 Contribute to the participant's own research paper and, after returning back to their country, their policy making and implementation
- 3 Expand the participant's network within Japan

Participant Research Themes

Enrollment year	Course	National origin	University	Research theme
2020	Doctor	Chile	Tohoku University	Development of dual diagnosis and Assessment Methodology for Bridges Systems as Tools for Post-Earthquake Inspection (Tentative)
2020	Doctor	Ethiopia	Osaka University	Developing Comprehensive Framework for Road Maintenance Delivery Strategy: The Case for Addis Ababa Roads Authority and Ethiopian Roads Authority, Ethiopia
2020	Doctor	Pakistan	Shibaura Institute of Technology	Development of Strategy for Road Asset Management
2020	Doctor	Pakistan	Kanazawa Institute of Technology	Efficient, Sustainable and Strategic Road Asset Management System based on Preventive Maintenance for Provincial Roads.
2020	Doctor	Kenya	Gifu University	An Analysis of Terrestrial Lidar Technology versus Global Navigation Satellite Systems (GNSS) Deformation Monitoring of Civil Structures
2020	Master	Philippines	Shibaura Institute of Technology	Monitoring of Carbon Footprint of Construction of Infrastructure Projects in the Philippines
2020	Master	Kenya	University of the Ryukyus	TBC
2020	Master	Kenya	Shibaura Institute of Technology	Establish and reinforce a Road Asset Management system that encompasses the whole road Network and is applicable on all roads in Kenya as well as properly integrate Bridge management systems comprehensively in Road maintenance.
2020	Master	Bhutan	Nagasaki University	Using Artificial Intelligence (AI) to Maintain Bridges in Bhutan
2020	Master	Bhutan	Shibaura Institute of Technology	Road Asset Management and Proper Investment Planning
2020	Master	Bhutan	Gifu University	Investigation of Moisture Damages to Flexible Pavement
2020	Master	Bhutan	The University of Tokyo	Road Asset Management using GIS and Remote Sensing: Case Study in Bhutan
2020	Master	Myanmar	The University of Tokyo	Effective maintenance system for cable type bridges in Myanmar, based on probabilistic approach in statistical analysis of the deterioration curve
2020	Master	Myanmar	Osaka University	Strengthening of Infrastructures, advance construction technology and development of construction materials
2020	Master	Kyrgyzstan	University of the Ryukyus	Modern technologies in the maintenance of bridges and roads
2019	Doctor	Egypt	Nagasaki University	Calibration of HDM-4 Pavement Deterioration Models for Leos National Highways
2019	Master	Bangladesh	Kanazawa Institute of Technology	Comparative Study of RC Beam Hybrid Strengthening with Thermoplastic and Thermosetting FRP Subjected to Static Loading
2019	Master	Mongolia	Gifu University	Crack detection of aged concrete decks based on deep learning image classification
2019	Master	Philippines	Kanazawa University	Study on the Environmental Monitoring on Proper Maintenance of Concrete Structures with Mortar Sensor (Provisional)
2019	Master	Philippines	University of the Ryukyus	Research and Development for Infrastructure Lifetime=Extending Maintenance Technology
2018	Master	Laos	Nagasaki University	Development of Lifetime Extending Maintenance Management of Steel Bridge Structure
2018	Master	Laos	Nagasaki University	The Study on the Inspection and Assessment Method of Bridge Structures for Infrastructure Asset Management
2018	Master	Laos	Hokkaido University	Study on Overloading Policy and Technology on Weigh Control in Lao PDR
2018	Master	Cambodia	The University of Tokyo	Estimation of Bridge Construction Years in Cambodia by the Analysis of Landsat Satellite Data

(As of December 2020)

After graduation I will continue research in my own country and contribute to low-cost infrastructure reinforcement.



Mr. Md Golam Mostofa

Affiliation: Ministry of Road Transport and Bridges
 University: Kanazawa Institute of Technology(M.D)
 Duration:2019.4 - 2021.3



National origin: Bangladesh



Last year, I enjoyed the Japanese tea ceremony. It was aristocratic and nice !



I like to explore Japanese culture and infrastructure development and want to see more mountains, castles, park.

Reason for Applying

I have been working for the Roads and Highways Department (RHD) since 2011. My responsibilities included Bridge infrastructure design and maintenance. My purpose in applying this program is to contribute to the strengthening of existing infrastructures to maintain serviceability performance and enhanced load-carrying capacity.

Research

The main objectives of my research are :

- To evaluate the performance of the flexural strengthening of RC beam specimen with an alternative, cost-effective thermoplastic CFRP material.
- Investigation of combined Near-surface mounted (NSM) and Externally bonded reinforcement technique (Hybrid Bonding method) applied to the strengthened specimen with a comparatively shorter span to depth ratio.

Prospect

After graduation, I will continue to research in my country and contribute to the strengthening of the existing bridge infrastructures with a low cost solution.

Daily life

I have been to many Bridge sites and enjoyed staying in Tokyo, Fukui, Nagoya, Gifu, and Nagasaki. At weekend, I like to visit the sea, mountains, castles, park with my family members.

Using the knowledge gained in Japan, I will contribute to reducing life cycle costs.



Ms. Tsogkhuu Khosgerel

Affiliation: Ministry of Road and Transport of Mongolia
 University: Gifu University(M.D)
 Duration:2019.3 - 2021.3



National origin: Mongolia



Akashi Kaikyo Bridge
 Total length -3911 m



Oda Nobunaga- the first "Great Unifier" of Japan

Reason for Applying

The Government Action Plan /2012/ aiming to connect all provinces with the capital city by paved road is approaching completion. The next challenge is how to keep the network in good condition. As road sector management in Mongolia is in the process of switching its focus from new construction to maintenance of the existing structure, I felt the importance of road asset management.

Research

"Corrosion Classification of Weathering Steel by Deep Learning method" Road Asset Management is a systematic and permanent process. Regular bridge inspection helps to make better decisions based on informed understanding of the current actual condition of the bridge. Briefly, regular inspection is the first step to the Strategic Asset management system and helps the road administrator to discharge their responsibilities effectively by data-driven systematic maintenance management.

Prospect

I will use my new knowledge to extend operational life and reduce the life cycle cost of roads and bridges in Mongolia.

Daily life

I like to go short trips in Japan to sightseeing and participating in short-term trainings. Last year, I traveled to Kyoto, Kobe, Nagoya, Yokohama, and Tokyo. This year, due to the pandemic disease I am minimizing the extracurricular activities. Luckily, my supervisor allowed me to travel to Ryukyu University in Okinawa last week. It was an amazing experience.

I want to make use of the knowledge gained in Japan to improve road management systems.



Mr. Bounthipphasert Soumphonphakdy

Affiliation: Ministry of Public Works and Transport
 University: Nagasaki University (Ph.D)
 Duration: 2017.10 - 2021.9



National origin: Laos



I am a member of Freestyle badminton club, and I very enjoy playing it in my free time.



I really enjoyed visiting the site of road rehabilitation because I was able to improve my knowledge and it was very helpful in my work and research.

Reason for Applying

My desire to apply this program is to contribute to roads and bridges maintenance and management systems in Laos.

Research

My research objective is to analyze the risks of managing roads in Laos to look for the best ways to improve them in tight budgets for maximum benefit and maximum efficiency.

Prospect

After I graduate from Nagasaki University, I will use the knowledge I have studied in Japan to improve the roads management systems in Laos.

Daily life

I have been to many famous places with my friends and enjoy staying in Nagasaki. During March to May in this year, I cannot go to my university because of COVID-19, so during that time it was quite difficult to research.

I want to contribute to the development of my beloved home country.



Mr. Thavone Khounsida

Affiliation: Ministry of Public Works and Transports
 University: Nagasaki University (Ph.D)
 Duration: 2017.10 - 2021.3



National origin: Laos



I love to play football and enjoy playing at the weekend with many friends. For my academic life, I love to spend time researching and participating in many joyful seminars and trainings.

Reason for Applying

I work on road and bridge training for many years, and I found that a lot of improvements are needed for road and bridge management in my country as well as developing countries around the world.

Research

My research objective is to develop a Lifetime Extending Maintenance Model for the steel bridge(The case study for the Bailey bridge in Laos).

Prospect

After I graduate from Nagasaki University, I will back to my country and contribute to developing for my beloved country.

Daily life

I spend time to research, enjoy tasting Japanese food and culture, and enjoy visiting many places around Nagasaki city. During the COVID-19 pandemic, it is a little tricky situation and challenging for daily life. Fortunately, we can use the internet and media for sharing and learning instead.

I will pass on to my home country knowledge and technology related to managing the assets of roads and bridges.



Mr. Mohamed Saied

Affiliation: _____
ENIT-Ministry of Transport
University: _____
Nagasaki University(Ph.D)
Duration:2019.4 - 2022.3



National origin:
Egypt



Reason for Applying

I've been a teaching assistant at the Egyptian National Institute of Transport (ENIT) since 2014. My responsibilities included teaching many Courses in the Highway and Traffic Department, in addition to participating in research projects. I'm very fortunate to participate in this program, which I've learned a lot about maintaining and investigation techniques for roads and bridges.

Research

The main objective of my research is to develop pavement deterioration models based on roughness for Laos National Roads network, the developed models help for; Eliminating expenses for obtaining and analyzing field Data. Helping decision maker for planning, setting priorities for maintenance and rehabilitation of deterioration roads.

Prospect

After graduation, I'll come back to Egypt and establishing a new diploma/short term training courses in ENIT about Road and bridge asset Management, as well as developing new prediction models for pavement deterioration and transferring new technologies for data collection and inspection to GARBLT (General Authority for Road Bridge and Land Transport).

Daily life

I've visited many prefectures in japan like Tokyo, Osaka, Nagoya, and Fukuoka. Also I used to participate in many outdoor activities like swimming, fishing, jogging. I'm so happy to lose weight 12Kg.

I will utilize my research conducted in Japan to improve infrastructure in my home country.



Mr. Amores Vincent Andrew Dayag

Affiliation: _____
Department of Public Works and Highways
University: _____
University of the Ryukyu(M.D)
Duration:2019.4 - 2021.3



National origin:
Philippines



The changing seasons also provide balance between research and recreation.

I love exploring places with my friend. We enjoyed the snow during the warm winter last year.

Reason for Applying

Through this program, I want to learn infrastructure maintenance of Japan which can help the Philippines.

Research

My research focuses on steel bridges. I am studying the effect of corrosion on friction joints as well as the distribution of pressure due to wind load. Additionally, I am trying to transcribe the "Anti-corrosion Manual of Steel Bridges in Okinawa".

Prospect

I plan to share the details and results of my research with my superiors and colleagues in the Philippines.

Daily life

For more than a year, I have been trying to learn Nihongo during rest days.

Case-1

**Nagasaki University,
Graduate School of Engineering**

**Associate Professor
Dr. Takafumi Nishikawa**

University outline
Location: Nagasaki City,
Nagasaki Prefecture
<http://www.nagasaki-u.ac.jp/>



A partnership that transcends the frameworks of universities and countries

In Nagasaki, there's a program for training road infrastructure maintenance engineers called "Michimori" that is in cooperation with Nagasaki Prefecture and Nagasaki University. There is also a program started for regular citizens that allows them to contribute to maintenance by watching over road infrastructure of the region.

There's a lot of interest from overseas, and some countries have even started their own personnel training programs modelled off of Michimori.

Associate Professor Dr. Nishikawa of Nagasaki University who worked on "Michimori" is accepting participants of JICA's "Core Human Resource Development for Road Asset Management Program" as international students. In collaboration with the National University of Laos, he conducts research with a Laotian international student on the Bailey bridges, while receiving a grant from the Japan Society of Civil Engineers. Dr. Nishikawa says that "Bailey bridges are found all around the world and the research outcomes in Laos are expected to be of use to various countries."

He mentions that new initiatives are also being created: "A good example is how an Egyptian international student, who was accepted into this program in Nagasaki University, is using the results of the JICA Technical Cooperation project that was conducted in Laos to continue research that's looking into strengthening and improving the road maintenance capabilities in Egypt."

Case-2

**Gifu University,
Graduate School of Engineering**

**Associate Professor
Dr. Koji Kinoshita**

University outline
Location: Gifu City, Gifu Prefecture
Nagasaki Prefecture
<http://www.gifu-u.ac.jp/>



Expanding the knowledge of Japanese universities to the world

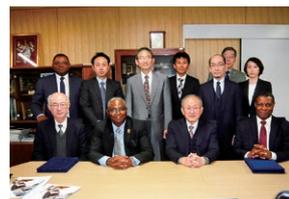
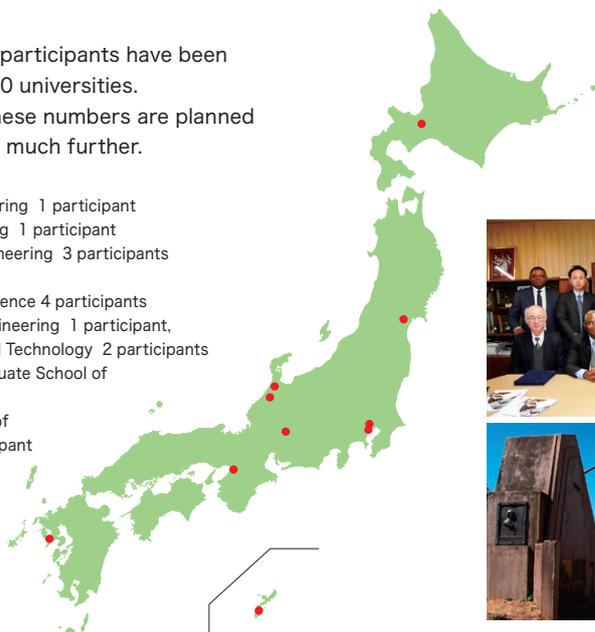
In 2019, Gifu University, after having participated in JICA technical cooperation survey projects in Zambia, made an agreement between faculties with the University of Zambia. Furthermore, Gifu University also participated in another JICA project for bridge maintenance capability building in Zambia from which it was decided for a bridge maintenance center to be launched within the University of Zambia's faculty of engineering in cooperation with both universities.

In the "Core Human Resource Development for Road Asset Management Program", as a part of the special program run in August 2019, a tour was conducted of Gifu University's "Infrastructure Museum", which contains full-size models of bridges and tunnels. Also, a bridge inspection demonstration was carried out at Kagamihara Bridge in Kagamihara City, Gifu Prefecture. It utilized the very latest technologies of Japanese private companies, which included robots, drones and non-destructive inspection devices. Associate Professor Dr. Koji Kinoshita told of the significance of this inspection: "Through an inspection that used assisting robots and drones - which was one of the first inspections of its kind in Japan - we were able to show participants the yearlong progress of cracks. This is data acquired through the very latest technology and it will continue to be of use from here on."

List of
Accepting
Universities

As of 2020, 24 participants have been accepted into 10 universities. In the future, these numbers are planned to be increased much further.

- Hokkaido University, Faculty of Engineering 1 participant
- Tohoku University, School of Engineering 1 participant
- The University of Tokyo, School of Engineering 3 participants
- Shibaura Institute of Technology, Graduate School of Engineering and Science 4 participants
- Gifu University, Graduate School of Engineering 1 participant, Graduate School of Natural Science and Technology 2 participants
- Kanazawa Institute of Technology, Graduate School of Engineering 2 participants
- Kanazawa University, Graduate School of Natural Science & Technology 1 participant
- Osaka University, Graduate School of Engineering 2 trainees
- Nagasaki University, Graduate School of Engineering 4 trainees
- University of the Ryukyus, Graduate School of Engineering and Science 3 trainees



The Project's Target Countries

Asia: 11 countries
 Africa: 6 countries
 Central and South America:
 2 countries (As of 2020)

Asia

- | | |
|---------------|---------------|
| 1 Laos | 7 Bhutan |
| 2 Cambodia | 8 Nepal |
| 3 Indonesia | 9 Bangladesh |
| 4 Philippines | 10 Pakistan |
| 5 Myanmar | 11 Kyrgyzstan |
| 6 Mongolia | |

Africa

- | | |
|------------|--------------|
| 1 Kenya | 4 Ghana |
| 2 Ethiopia | 5 Madagascar |
| 3 Zambia | 6 Egypt |

Central and South America

- | |
|---------------|
| 1 Chile |
| 2 El Salvador |

Having the road and bridge maintenance engineers of developing countries study at Japanese universities

As a part of the JICA road asset management platform, an initiative has started to have engineers who handle road and bridge maintenance in developing countries study at Japanese universities as long-term trainees ("international students" at the universities), and already over 20 participants are currently studying in Japan. Road and bridge maintenance differs from new construction projects in that it requires perspectives and expertise that are long-term as well as diversified in technologies and systems. This field covers inspection, diagnosis, repairing technology, data management and analysis, as well as budget estimation based on future estimates. These engineers have mostly experienced working on maintenance in developing countries where the infrastructure is set to improve from here on, and by having them study in Japan, it's expected that their consideration of maintenance from the construction stage will bring about higher quality infrastructure.

I myself have already accepted in some participants (international students) from Cambodia, Myanmar and Bhutan, and by being able to find out about the actual circumstances of these countries' infrastructure management I've been able to gain information that is also beneficial to Japan. For the research themes, we are using the latest research that matches the needs of each country. For example, a Cambodian participant's master's thesis is about estimating the undocumented construction years of bridges in Cambodia through

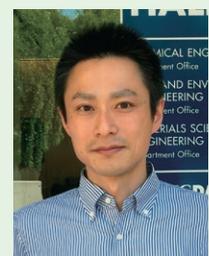
using data from satellites to trace back the bridges' previous circumstances.

JICA is also offering opportunities for them to find out extensively about the circumstances in Japan through holding research presentations where the participants meet together and through organizing training tours to places where maintenance work is conducted in Japan. Having engineers who are central to the maintenance of roads and bridges in their own countries study in Japan allows them to also become important people in the future for when transferring technologies from Japan. I'm participating in these activities in view of the importance of not only having the participants bring Japanese technologies and knowledge home with them, but also of them growing to like Japan and continuing to have connections to Japan even after returning home.

**Associate Professor, Institute of Industrial Science,
 The University of Tokyo**

**Section Chief of the International Expansion Section,
 Promotion of New Technology Application
 Subcommittee, Infrastructure Maintenance
 General Committee, Japan Society of Civil Engineers**

Dr. Kohei Nagai





**Transportation Group,
Infrastructure Management Department,
Japan International Cooperation Agency (JICA)**

<http://www.jica.go.jp/>

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