

III. Results of Joint Review

Terminal Evaluation of the Project was conducted from September 11 to October 1, 2019 to 1) confirm the achievements of the Project, 2) evaluate the Project based on five DAC Evaluation Criteria, 3) identify factors promoting / inhibiting project effects, and 4) give recommendations to the Project during the remaining project period as well as after the project completion.

The evaluation was conducted by the Evaluation Team (hereafter called the Team) which consisted of five Japanese and one Myanmar namely 1) Mr. Nobuo Iwai, Senior Representative from JICA Myanmar Office as a Team Leader, 2) Mr. Wataru Ono, Deputy Director, Disaster Risk Reduction Team 1, Disaster Risk Reduction Group, Global Environment Department of JICA as an Evaluation Planner, 3) Dr. Kaoru Takara, Dean of Graduate School of Advanced Integrated Studies in Human Survivability, Kyoto University as a Senior Researcher, 4) Mr. Kazuo Anazawa from JST as an Observer, 5) Ms. Ayako Namura, a Consultant from Tekizaitekisho, LLC as an Evaluation Analyst and 6) Ms. New Ni, Deputy Director General, Department of Higher Education, Ministry of Education as an Evaluator.

1. Results of Review based on DAC Evaluation Criteria

1-1 Relevance

The relevance of the Project is assessed as high based on the following facts and findings of the Team.

Consistency with the policies of the Government of Myanmar

Myanmar Sustainable Development Plan 2018-2030 issued in August 2018 provides a long-term vision of a peaceful, prosperous and democratic country. It is structured around three pillars, five goals, 28 strategies and 251 action plans to realize this vision. Under “Goal 5: Natural Resources and the Environment for Posterity of the Nation”, the strategy of reducing exposure to disaster is addressed as “Strategy 5.2: Increase climate change resilience, reduce exposure to disasters and shocks while protecting livelihoods, and facilitate a shift to a low-carbon growth pathway”. Myanmar Action Plan on Disaster Risk Reduction 2017, which set an overall target for 2030 and a comprehensive and unified action plan for disaster risk reduction with prioritized interventions across Myanmar until 2020. The plans have four Pillars including 1) assessment of disaster risk, 2) strengthening disaster risk governance, 3) mainstreaming disaster risk reduction, and 4) enhancing disaster preparedness. Therefore, the Project is highly aligned with the policy and plan of the Government of Myanmar.

Consistency with the policies of the Government of Japan

The Project is in line with the policies of the Government of Japan. Japan, in April 2012, addressed three pillars to assist Myanmar in: 1) improvement of the living standard of the people, 2) institutional development and capacity development of human resources that would contribute to the social and economic development, and 3) development of infrastructure and systems that enable sustainable development of the country. The Project corresponds to the policy of all pillars from the perspective of disaster risk reduction. The cooperation program between Japan and Myanmar issued in November 2016 identifies that nine pillars, one of which focuses on long-term and orderly urban development, disaster-related measures and housing and urban transportation. In this regard, the Project, which aims to establish a disaster resilience system and collaboration platform, is aligned with the policies of the Government of Japan.

Alignment with the Sendai Framework for Disaster Risk Reduction 2015-2030

The Sendai Framework for Disaster Risk Reduction 2015 -2030 adapted on 18 March 2015 calls for focused action within and across sectors in the four priority areas. The Project can contribute to all of the four priorities by developing a Comprehensive Disaster Resilience System and a Collaboration Platform for urban safety Yangon and Bago.

Priorities for Action in the Sendai Framework for Disaster Risk Reduction 2015 -2030

Priority 1: Understanding disaster risk.

Priority 2: Strengthening disaster risk governance to manage disaster risk.

Priority 3: Investing in disaster risk reduction for resilience.

Priority 4: Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction.

Consistency with needs of the Myanmar target groups and Appropriateness of project approaches

Myanmar has experienced severe disasters such as cyclones, storm and floods, as shown in the table below. Also, the large active fault called Sagaing Fault runs in the middle of the country and caused an earthquake in November 2012. To respond and be prepared well to/for a natural disaster, Myanmar had strong needs of applying science and developing technology to grasp a disaster and assess the vulnerability. In this respect, the Project’s objective of developing a disaster resilient system and a collaborative platform for urban safety responds to the needs of the Myanmar people.

Date	Disaster and affected areas	Causalities and damages
August 2019	Landslide Mon State	73 Casualties at Malat Thauung Landslides. Besides, the road link between Maulamyaing and Dawei was severely damaged around Ye Township.
August 2018	Floods in Bago	Over 152,000 people evacuated, which leads emergency relief operation by Japan/ JICA
July 2018	Floods in Bago, Karen, Mon, Nay Pyi Taw, Tanintharyi, Magway, Sagaing, Ayeyarwady, Kayin	16 deaths, 109,659 people affected
July-August 2015	Severe landslides in Chin State, and floods particularly in Sagaing Region, Ayeyarwady Region and Magway Region	around 160,000 and 110 causalities
August 2014	Floods in Bago Region	15,850 people evacuated
August 2013	Monsoon floods in Kayin, Mon, Tanintharyi and Rakhine State and the Ayeyarwady	38,316 people displaced
November 2012	Earthquake in Sagaing	M 6.8, 13 death
August 2012	Whole country	Several thousand people displaced in Kayin State
October 2011	Floods in Magway	161 death, 30,000 people affected
August 2011	Floods in Bago	23,097 houses affected, 55,489 people affected
March 2011	Earthquake along the border with Thailand	M 6.8, 74 death
October 2010	Cyclone Giri, Rakhine State	45 death or missing 101,923 people remained homeless

Source: EM-DAT, International Disaster Database, Center for Research on the Epidemiology of Disaster – CRED (<https://www.emdat.be/index.php>) and JICA Myanmar Office

Appropriateness of selection of target counterpart

The Team concluded that the selection of target counterpart was appropriate since YTU is a top university in a country and specialized in technology and science. Setting the relevant agencies as Strategic Partners were significantly appropriate since the Project needed to have good cooperation with them in terms of sharing the observational data or existing data necessary for research activities and get them involved in the project activities since they were the primary users of the system which the Project developed.

1-2 Effectiveness

The effectiveness of the Project is assessed as relatively high.

Prospect of achieving the project purpose

The Team concluded that the Project has been effective for YTU to understand and develop a Comprehensive Disaster Resilience System and a Collaboration Platform for urban safety in Yangon and Bago to a great extent. The Project provided YTU teachers with opportunity of exposing world-class research activities and

cutting-edge technology, and this has brought their research capacity up dramatically. Now, YTU is recognized as the most advanced university in the field of disaster risk reduction.

Concerning a Collaboration Platform for urban safety, the Project was successful in establishing RS/GIS RC and has carried out some activities such as providing the classes of remote sensing at YTU and developing various digitalized maps with cooperation of other groups. Another Collaboration Platform for urban safety, namely the Consortium, is still underway to its official establishment and has not functioned yet as of the terminal evaluation. This is because the concept of Consortium, which is a collaborative framework among government, academia and industry, is entirely new in Myanmar and it takes time to obtain the approval of the Government of Myanmar. Considering these aspects, the Project generated a maximum result of establishing the Consortium.

As for the Comprehensive Disaster Resilience System, the Project needs to focus on some activities to ensure that the Strategic Partners can operate it. These include the localization of the Disaster Management Support System and the preparation of its manual in Myanmar language to promote its usage at the local authorities. Since YTU has the plan to provide more intensive training on this system, this will also ensure the good operation of the system.

Factors contributing to the achievement of project purpose

The factors contributing to the achievement of project purpose are examined as follows.

- In the Water-related Disaster Group, the Japanese researchers, YTU counterparts and Strategic Partners such as DMH, DWIR, IWUMD and DDM have good collaboration and motivation toward the enhancement of infrastructure management and technology and monitoring system, which contributed to bringing good results of research activities.

Logic from Outputs to Project Purpose

Achievement of outputs certainly will lead to the accomplishment of Project Purpose since the components necessary for development of a Comprehensive Disaster Resilience System and a Collaboration Platform were designed as the four outputs: collection of existing data and measurement of observational data, and development of models (Output 1), development of scenario analysis and assessment of future vulnerability (Output 2), development of a platform for research such as RC and Consortium (Output 3) and development of the integrated disaster response support system (Output 4). The Project is likely to achieve the four Outputs set in PDM and this will certainly lead to achieving the Project Purpose.

To date, no external factors affecting the project effectiveness have been observed, including the important assumption¹ which is defined in the PDM.

1-3 Efficiency

The efficiency of the Project is assessed as moderate.

All planned outputs will be likely to reach the targets. Since the Project mostly utilizes the existing basic systems such as DIAS and Disaster Management Support System which Japanese municipalities already utilize, the Project did not have to develop a system from the beginning and saved the budget for system development. On the other hand, the activities mainly related to the data collection activities and establishment of the Consortium, have to be extended. With regard to data acquisition necessary for developing various models and systems, it took longer time due to the difficulties in finding good quality of data in terms of both quality and quantity in Myanmar: in other words, difficulties were 1) uncertainty of data availability, 2) lower reliability of data, and 3) a lengthy administrative procedure to obtain approval for data sharing from other agencies.

In general, most of the project inputs have been appropriately delivered in terms of quantity and quality and in a timely manner and utilized for project activities and generating outputs. However, some issues on equipment provided were found as follows;

¹ The PDM defines the important assumption toward the Project Purpose: “research center for urban safety is officially established under the responsibility of YTU during the cooperation period”.

- 1) The 50 sets of GPS, which was initially installed to the public buses to monitor the movement of public transportation but taken off due to the restructuring of the bus routes in Yangon in 2017, have not been utilized by YTU. At this moment, the Project is considering alternative utilization of GPS.
- 2) The analysis software of microtremor procured through the Project runs in only Japanese. Although the Project prepared the English manual for YTU for major functions, the full function of this software cannot be utilized at YTU. The Project, currently, asked the company to localize the analysis software into English. It is expected that this will promote the utilization of microtremor.
- 3) The manuals of some of the equipment provided are only available in Japanese. The Project is currently compiling the list of equipment including detailed information of name, purpose, stored place, availability of manuals, and contact of equipment and identifying the equipment, for which the English manual should be prepared. This will promote the utilization of equipment and maintenance based on the compiled information.

Another factor interfering with project efficiency is the allocation of JICA expert and counterpart personnel. Concerning allocation of JICA expert, the position of a project coordinator was vacant for the first year. Due to this, YTU had to manage many administrative procedures with JICA including the procurement process of equipment. This was a heavy burden for YTU and limited the smooth disbursement of the project budget. With regard to the assignment of counterpart, the group leader of Infrastructure/Earthquake-related Disaster left the Project to participate to PhD program in Japan and the counterparts assigned for Infrastructure Group afterwards did not have sufficient background and motivation of/toward infrastructure management. This degraded the effective technology transfer in this field to YTU counterparts. Also, in the first half of the project term, the discussion on research activities was not promoted as expected since YTU teachers had less experience in doing research activities compared with the Japanese researchers. Although this situation has been gradually changed, particularly in the latter half of the project term, it adversely affected project efficiency.

1-4 Impact

There is a possibility to generate the impact of the Project in the future if some conditions described below are satisfied.

Prospects of Achieving the Overall Goal and utilization of research outcomes

If YTU continues and upgrades the research activities after the Project ends, there is a possibility to achieve the Overall Goal. For continued research activities at YTU, the issue to secure the research funds is one of the crucial issues (for more details, see “1-5 Sustainability”) meaning whether project impact is significantly generated depends on the financial issue. In this term, it is vital that the Consortium is firmly established and its research activities through the Consortium are very active. This will certainly create a virtuous cycle for research activities. It is also likely that the Consortium is a good channel not only to obtain research funds but also to strengthen the relationship with government and industry, users (customers) of research outcomes and to grasp the needs of users. Since the Consortium, which the Project supports its establishment, is a first collaborative framework among government, academia and industry in Myanmar, it may bring an impact to promote such collaborative framework in Myanmar in the future. Also, it is expected that the Consortium will contribute to enhancement of the YTU’s role and function as the research institute.

Another important issue is the continued enhancement of research capacity of YTU. While the Project was effective to enhancing YTU’s research capacity, further external assistance to enhance research capacity consciously is needed to generate project impact.

Other impacts

The RS/GIS RC provided the training to teachers of other universities who are interested in remote sensing in October 2018 and YTU has a plan to offer it annually. According to YTU, this is the national university’s responsibility of raising the whole level of capacity of teachers in Myanmar. In this respect, the project effects will be extended to other universities. YTU has also conducted the research of damage from a landslide in Chin State apply what they have learned through the Project.

Moreover, the Project has been collaborating with other JICA projects during the project implementation as follows.

- The Transport and Human Mobility Group improved the technology and enhanced the monitoring activities of the number of vehicles by types through the closed-circuit television (CCTV) in Yangon. The data was shared with the consultant team of Project for Improving Public Bus Service in Yangon (JICA's technical cooperation). Also, the Traffic Control Center of YRGA showed an intention to introduce this technology, the Project for Improving Public Bus Services is considering incorporating this activity in the project component.
- The research outcome of the relation between water-related disaster and poverty in Bago was shared with JICA experts of Urban Planning Project at YCDC.
- JICA has a plan to implement a new technical cooperation project for capacity enhancement of maintenance of bridges in Myanmar. Under the project, MOC, which the Project has worked together for bridge monitoring, will be the key counterpart and YTU will join in the project to provide technical support for high-level analysis of observational data.
- A simple monitoring system of bridge conditions, which the Project developed and utilized to Twantay and Pathein Bridges, will be applied to the construction of new Bago Bridge with support from JICA and the system is already included in the design of a new bridge.

1-5 Sustainability

The project sustainability examines whether the effects generated by the Project will continue after the cooperation term ends. Overall, sustainability is assessed as moderate as explained below.

Policy and institutional perspectives [High]

The policy environment in relation to disaster risk reduction has been favorable to date as stated in “1-1 Relevance”. The Government of Myanmar strongly committed to strengthening the disaster risk reduction as addressed in Myanmar Sustainable Development Plan 2018 – 2030 and Myanmar Action Plan on Disaster Risk Reduction 2017.

It seems that MOE will introduce a new policy to give universities a certain level of power of autonomy (semi-autonomy). Autonomy covers curriculum development, personnel, financial, and administrative issues. At this moment, it is not officially announced to what extent university will obtain the power of autonomy. When, even gradually, it is realized, this policy will assist YTU in keeping the teachers who enhanced their capacity through the Project staying at YTU and ensuring project sustainability.

Organizational perspective [Moderate]

In regard to the organizational aspect, the concerned issue is the teachers' relocation among universities which is yearly conducted based on the policy of MOE. The key teachers of YTU who have enhanced the research capacities through the project activities need to keep staying at YTU to ensure the organizational sustainability; however, they have to follow the MOE's decision for personnel relocation. Also, as other universities in Myanmar face, the number of teachers at YTU is not sufficient² and YTU needs a greater number of teachers and researchers to promote research activities. Since this also depends on the government decision, it is expected that a more number of teachers and researchers will be increased in the future.

Financial perspective [Moderate]

It is uncertain whether YTU can secure the budget for research since in Myanmar, not a large budget is allocated for the universities. YTU can allocate approximately 25 thousand USD annually for researches³. The Project has worked on the establishment of a Consortium, through which it is expected to acquire research fund for YTU; however, its full establishment is still on the way since the official approval of MOE for consortium's establishment is required to obtain research fund at the Consortium. The ICUS of The University of Tokyo has a plan to set up a base of research at YTU promoting collaborative researches in Myanmar and the plan and budget were approved in September 2019. At this moment, The University of Tokyo and YTU are examining how to make a remittance of research funds to YTU. Once the mode of remittance is identified, this research fund will greatly support for YTU's research activities. Another concern

² According to the interview with YTU, the approved number of staff at YTU is 953; however, the total number of personnel is 620 now. Among 620, the teachers are 320. Also, there is a rumor that MOE may introduce autonomy of university in the late of 2020, allowing the universities to have authority over personnel issues. If this is realized, YTU may secure a more number of teachers in the future.

³ According to the interview with YTU.

is the budget for repair of provided equipment. Since the budget for maintenance of equipment is limited at YTU and the Strategic Partners, this issue also affects the financial sustainability.

Technical perspective [Moderate]

The knowledge and technology transferred by the Project have been well accepted by the Myanmar counterparts and the project's Strategic Partners. The YTU's teachers have substantially enhanced the capacity of pursuing the research activities and the Strategic Partners have also learned how to utilize the systems developed by the Project. Since several key personnel of YTU has been trained for the research fields related to the Project, it is expected that the knowledge and skills enhanced by the Project will be transferred to other teachers and students, yet, the capacity of YTU needs to be enhanced continuously and advance for world-class research activities further. In this term, still YTU needs external support for continued capacity enhancement of research activities. At this moment, ICUS of the University of Tokyo is considering continued collaborative research with YTU under the umbrella of international cooperation scheme of ICUS. If this is realized, YTU will have a good opportunity to enhance their research capacity in the future.

There is a concern about the maintenance of equipment. As described "1-3 Efficiency", the English manuals for some of the provided equipment need to be prepared to ensure the technical sustainability. Besides, the repair of equipment is a challenging issue. During the project implementation, the broken microtremor and a hydro/meteorological sensor were repaired in Japan. Without the support of the Project after the project term ends, YTU and the Strategic Partners have to send the equipment necessary for repair work to abroad such as Singapore or Thailand since an agent or a branch office of equipment is not located in Myanmar. Notably, it is very difficult to identify a source of trouble of hydro/meteorological observational equipment since it requires the knowledge and experience of maintenance work, including IT and electronics. Currently, the Project is compiling the detailed information about equipment to ensure the technical sustainability. It is also expected that the continued support from ICUS of The University of Tokyo will be extended to YTU in the future. In sum, technical sustainability is assessed as moderate.

2. Key Factors Affecting Implementation and Outcomes

Social and political environments surrounding the Project have been relatively stable. However due to the status of YTU which has not yet acquired its autonomy, establishment of the Consortium was directly affected as YTU had to ask the Ministry of Education before making any decisions related to it and the Project had to adjust its plan and contents according to the request from the Ministry of Education several times. And every time, Myanmar's procedure responding to the Japan's answer took an incredible amount of time, resulting in a major hindrance to the action plan.

3. Evaluation on the results of the Project Risk Management

The Japanese side responded to the reformation of the ministerial structure without major issues and Myanmar side has also taken all necessary procedures such as visa and travel permission for the JICA experts.

IV. For the Achievement of Overall Goals after the Project Completion

1. Prospects to achieve Overall Goal

Overall Goal	Objectively Verifiable Indicators
YTU further utilizes the Collaboration Platform to contribute to the urban safety in Yangon and Bago	<ol style="list-style-type: none"> 1. At least 4 policy proposals on the result of the Comprehensive Disaster Resilience System are made for relevant governments by YTU team 2. At least 20 specialized persons in urban safety sector are trained at YTU

Overall Goal is prospected to be achieved based on the following.

Objectively Verifiable Indicators for the Overall Goal have been achieved as mentioned in 2-2 Project Purpose and indicators, since a total of 5 policy related documents were already submitted during the Project and a total of 216 certified specialized persons were trained by YTU, UTokyo and other related organizations.

Moreover, new research projects have been formed as a result of the Project and its continuous effort by some groups such as Infrastructure group. A new project for technical transfer funded by JICA for road and bridge maintenance is formulated based on the output from the Project and the project leader of Infrastructure Group prepared a detailed plan in collaboration with MOC, YTU and Japanese organizations. In the next project, the equipment donated for the Project will continue to be utilized. Also research activity for infrastructure management will be continued with a new research fund by Japan Society of Civil Engineers (JSCE) for an application of non-destructive inspection and monitoring technology in Myanmar and human resource development.

2. Plan of Operation and Implementation Structure of the Myanmar side to achieve Overall Goal

The Myanmar side shall continue its communication with MOE to realize the establishment of the Consortium which is at the final stage of getting approval as of March 2020. YTU is expected to continue research activities as it has been doing for the past years during the Project period and promote a full utilization of resources provided by the Project such as facility of the Research Center, donated equipment and collaborative relationship with the Strategic Partners which are key organizations to contribute to the urban safety in Yangon and Bago.

3. Recommendations for the Myanmar side

(1) Strengthen the organizational capacity of RS/GIS RC

It is recommended that YTU strengthens the capacity of RS/GIS RC by making decisions regarding human resource and financial matters. For example, selecting the members of a management committee, allocating the staff, securing research funds, services and outputs which RS/GIS RC can offer, and collaboration protocol to promote research activities with the Strategic Partners and other institutes. These issues need to be examined considering the policy of the university's semi-autonomy to be introduced in coming October 2020.

Actions taken in response to Recommendation (1):

The Japanese side requested the Myanmar side to consider the following three possibilities to strengthen the organization; 1) inviting visiting professors, 2) accepting public application for human resource, 3) promoting human resource within YTU including other fields such as Forestry or Geography. The Project members, especially Prof. Sao Hone Pha and Prof. Kyaw Zaya Htun, the Directors of RS/GIS RC and the Japanese counterpart Professor Dr. Takeuchi from RS/GIS RC put a great effort in establishing a strong network between YTU and MTU while supporting to strengthen MTU's RS/GIS section for future collaboration between the two universities.

On 13 February 2020, a joint workshop between RS/GIS groups from MTU, YTU and UTokyo was held successfully and three action items were proposed to continue collaborative research activities; 1) Extraction of building footprint for all townships in Yangon: YTU agreed to request YCDC to validate extracted shape files and plans to participate in One-Map Project for YCDC which will help increase YTU's accessibility to information; 2) Flood monitoring in Yangon and Mandalay region during rainy season: MTU plans to conduct flood mapping for Mandalay using ground flood marks points by surveying with RTK after one week of flood period. YTU and MTU can use these ground check points to validate flood maps from both Sentinel images and PALSAR 2 images; 3) Extraction of building footprint for Mandalay: Permission from MCDC is needed to gain access to Mandalay's UAV image data to be used for a training and also permission from JICA is needed to use building footprint data of Mandalay.

(2) Establishment, management and operation of the Consortium

It is expected that the YTU to complete the establishment of the Consortium which is already under finalization process. Under the Consortium, research activity and collaboration among the members of the Consortium shall be promoted and YTU to take a leading role to encourage active participation among government, academia and industry to contribute to the urban safety in Yangon and Bago.

Actions taken in response to Recommendation (2):

The Project put a great effort in order to get a permission from MOE for establishing the Consortium before the end of the Project by continuing to communicate by all means including direct contact, emails and phone calls for the realization. Thanks to a committed work by SATREPS Project Office at YTU, YTU completed the Article of Association (See Annex 2-5_18) and prepared a final set of documents including the names of signing persons requested by MOE and submitted in March 25. The Project planned to have a formal signing event for the establishment of the Consortium during a final ceremony for the Project which was scheduled to be held in Yangon at the end of March, however a ceremony was postponed due to covid-19 situation and the Project ended before receiving official permission from MOE for the establishment of the Consortium. As of 31 of March, the documents have been reviewed by MOE and YTU continues to wait for a response from MOE.

(3) Management of donated equipment

It is recommended that YTU promotes active and effective use of donated equipment for research activities while ensuring a sustainable maintenance system for a long-term use of the equipment. Using an "Equipment List" made by the Project and provided to YTU including all the necessary information about each equipment such as name, purpose, availability of manuals, and contact information of the manufacturer, etc., proper management of all the donated equipment shall be carried out. For some equipment, it may be difficult to repair as no technical support may be available in Myanmar and therefore, it is expected that YTU and the Strategic Partners will make maximum efforts to keep the lifetime of equipment longer with proper maintenance work.

Actions taken in response to Recommendation (3):

A list of Equipment was compiled by a committed work by SATREPS Project Office at YTU (See Annex 1-4 List of Donor Equipment updated 20200318). The list includes important information which is necessary for maintenance such as manual availability, company & contact info and warranty as well as the names of responsible person for the equipment in YTU. Manuals for the equipment both made by the Project and provided by the manufacturers were attached in the Annex 1-5.

(4) Utilization of the Systems developed by the Project

YTU shall become familiar with 3 systems developed by the Project and actively promote their usage to the counterparts at YTU as well as Strategic Partners. Practical training course and seminars can be conducted regularly to potential users.

Actions taken in response to Recommendation (4):

Workshops and seminars were conducted by the Project in order for the Myanmar side to be familiarized with the system.

Disaster Management Group under Prof. Tun Naing and Dr. Numada conducted workshops and seminars at YTU together with concerned Strategic Partners including GAD, DDM, and YCDC, demonstrating the Disaster Management Support System. The flow chart of Disaster Management Support System was translated into Myanmar language in order to make it accessible to Myanmar users. See website: <http://eng.iis-boss.com/work-flowchart#> (ID: myanmar_admin, PW: kumamon).

Transportation Group organized a training to YTU students in December 2019 to demonstrate “City Geospatial Dashboard” and collected building information with smartphones together with RS/GIS Group. The group also conducted a workshop in January 2020 to demonstrate cloud-based CCTV vehicle counting, interactive spatial analysis and geo-visualization functions for hourly Grid-population, Link-speed, and People flow and direction, resulting from students’ research outcomes. Participants including YCDC, Myanmar Transport Authority, Yangon Bus Service, Crime and Traffic Accidents Control Center, Myanmar Management Information Unit and ALMEC had active discussion about future mitigation of traffic congestion and accidents, use of big data especially CDR for Yangon City development project and future research & development collaboration with YTU and UTokyo. See websites for two systems: <https://myanmar.geospatial.jp/ckan> for Myanmar G-Spatial Information Dashboard and https://harmony-geospatial-analytics.com/city_geospatial_dashboard for City Geospatial Dashboard.

Water-related Disaster Group under Profs. Win Win Zin and Kawasaki, Dr. Seemanta Bhagabati conducted a workshop and a seminar at YTU together with Strategic Partners including IWUMD, DWIR, DMH, DDM and DHPI, demonstrating the Near-real-time Inundation Analysis System for Bago River basin. Also, workshops were held in Bago with local Strategic Partners including Bago Region Chief Minister, and the system was directly introduced to Director Generals and high-level officers of DMH and DHPI in Nay Pyi Taw and to Acting Director General of DWIR in Yangon. The System is accessible among Strategic Partners via internet, and graphical user interfaces for both desktop PC and smart phone are developed.

(5) Continuation of research activities

It is recommended that YTU continues research activities and promotes them further at YTU applying knowledge and skills enhanced through the Project activities. It is expected that YTU teachers and students submit the academic papers for international journals and present the research results at the conference of the Myanmar Society of Civil Engineers established in 2019. Moreover, it is recommended that YTU conducts these research activities based on the needs of the Consortium members. This will contribute to accumulate more results and achievements as the Consortium’s activities, which demonstrates its significance and creates a virtuous cycle of fundraising for research activities.

Actions taken in response to Recommendation (5):

The Project members supported research activities of YTU by encouraging to submit papers to journals and conferences. As a result, in the remaining half year of the Project (from October 2019 to March 2020), 31 research papers were submitted to peer review international journals (18 papers written with Myanmar side as main author) and 32 research papers were presented at conferences (12 by Myanmar side as main author) (See Annex 5-9_Monitoring Sheet No,9).

4. Monitoring Plan from the end of the Project to Ex-post Evaluation

Ex-post Evaluation of the Project shall be conducted after three years of project completion as one of the requirements of the Japanese Official Development Assistance (ODA) scheme.

- (1) The status of the Consortium and its activities shall be monitored in order to check the effect of governmental, academia and industry collaboration and its contribution to the urban safety in

Yangon and Bago (e.g., meeting minutes, activity records, etc.).

- (2) The role and activity of the RS/GIS Research Center shall be monitored to check how it has contributed to create an active research environment and also its involvement with the Consortium as a facilitating organization (e.g., activity records, seminars, research projects, consortium support activity records, etc.).
- (3) The condition of the donated equipment shall be monitored thoroughly using the “equipment list” to check how often, which kind of equipment are utilized, for what purposes. Also its maintenance management shall be monitored to make sure it is used properly (e.g., records of usage of equipment, purpose, period, place, name of user, condition (with or without breakdown or damage) at the time of return, etc.).
- (4) Three systems developed by the Project shall be monitored to check how they have been used to contribute to the urban safety of Yangon and Bago and how they have been updated and / or maintained properly to be used properly (e.g., records of usage or introduction by ministries and companies, and update / modification).
- (5) Research activities of YTU faculty members and students shall be monitored to check if the research activities have continued after the completion of the Project by checking the number of papers submitted to international journals and the number of presentations at international and domestic conferences and the number of presentations at international and domestic conferences.

END

ANNEX 1: Results of the Project

- 1-1 List of Dispatched Experts
- 1-2 List of Counterparts
- 1-3 List of Training
- 1-4 List of Equipment provided by the Project (See Separate Volume)
- 1-5 List of Manuals for Donated Equipment (See Separate Volume)
- 1-6 Cost of Operation

ANNEX 2: List of Products Produced by the Project

- 2-1 List of Research Papers
- 2-2 List of Policy Related Documents (See Separate Volume)
- 2-3 List of Systems (See Separate Volume)
- 2-4 List of Persons acquired degrees
- 2-5 List of Other Products (See Separate Volume)

ANNEX 3: PDM (All versions of PDM)

- 3-1 PDM Version 0 Approved in April 2015
- 3-2 PDM Version 1 Approved in Nov. 2017

ANNEX 4: R/D, M/M, Minutes of JCC (See Separate Folder for below documents)

- 4-1 Minutes of Meeting 19 September 2014
- 4-2 Record of Discussion 9 April 2015
- Minutes of Meeting (Amended RD) 10 May 2018
- 4-3 Minutes of Meeting from JCC No.1 15 September 2015
- 4-4 Minutes of Meeting from JCC No.2 13 September 2016
- 4-5 Minutes of Meeting from JCC No.3 26 October 2017
- 4-6 Minutes of Meeting from JCC No.4 30 October 2018
- 4-7 Minutes of Meeting from JCC No.5 1 October 2019

ANNEX 5: Monitoring Sheet (See Separate Folder for below documents)

- 5-1 Monitoring Sheet No.1 2016.4
- 5-2 Monitoring Sheet No.2 2016.10
- 5-3 Monitoring Sheet No.3 2017.7
- 5-4 Monitoring Sheet No.4 2017.10
- 5-5 Monitoring Sheet No.5 2018.5
- 5-6 Monitoring Sheet No.6 2018.10
- 5-7 Monitoring Sheet No.7 2019.9
- 5-8 Monitoring Sheet No.8 2020.3
- 5-9 Monitoring Sheet No.9 2020.3