

Republic of Indonesia

FY2016 Ex-Post Evaluation of Technical Cooperation Project (SATREPS<sup>1</sup>)

“Wild Fire and Carbon Management in Peat-forest in Indonesia”

External Evaluator: Miho Kawahatsu, OPMAC Corporation

## 0. Summary

The purpose of the project was to promote the implementation of REDD+<sup>2</sup> in Indonesia by developing a fire detection and fire prediction system, remediation of peatlands and forest through efficient water management, and establishing effective absorptive and storage capacity for greenhouse gas, and particularly CO<sub>2</sub>.

The importance of forestry management for reduction of greenhouse gas generation and the regional importance of Kalimantan, are consistent with Indonesian development policy. Further, they have been consistent with the need for the management and remediation of peatland which has grown in recent years. In Japanese development assistance policy, importance is assigned to the field of climate change and conforms to the policy of promoting a comprehensive approach. Therefore, the relevance is high. Regarding effectiveness, as a study of assessment of carbon emission, as well as that of carbon management methods, have been specifically engaged from various perspectives, it has been partially accomplished. However, regarding the establishment of a system for appropriate management of peatland and forests, to be shared with the government of Indonesia as well as the international community, as well as building a system for prevention of global warming, were not achieved because the planned activities during the project period were not carried out. Regarding impact, efforts for actual application are continuing towards a functional system of Measuring, Reporting, and Verification (MRV)<sup>3</sup>. Note that because no overall goal was set, this is not included in the evaluation of the project impact. Another collateral impact is the achievement of efficiency in broad-area water management by the system to measure hydrological data procured by the project. Therefore, effectiveness and impact are fair. The project was completed within the time provided and project cost exceeded the planned amount so that efficiency is fair. Sustainability is judged to be high, as the necessary policy rationale for continuation of the results of the project, its institutional arrangements, technical aspects, and financial aspects are still in effect, reflecting the need for peatland recovery in Indonesia.

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<sup>1</sup> SATREPS: Science and Technology Research Partnership for Sustainable Development

<sup>2</sup> The addition of the concept of preserving the carbon stock of forests, management of forests for sustainability, and improvement of the forest carbon stock in accordance with COP13 (The 13<sup>th</sup> Conference of the Parties, 2007) to the proposal at COP11 (2005) for “Reducing Emissions from Deforestation and Forest Degradation in Developing Countries” (REDD) resulted in what is known as REDD+. Up to this time, REDD+ had not been formally positioned in accordance with the Kyoto Protocol, but was formally recognized at the COP21 (effective November 2016, applicable 2020 onwards) by *Article 5, Paragraph 1 of the Convention*, “Parties should take action to conserve and enhance, as appropriate, sinks and reservoirs of greenhouse gases (snip) including forests,” and a following Paragraph 2 indicates the REDD+ was officially positioned as “Parties are encouraged to take action to implement and support (snip).”

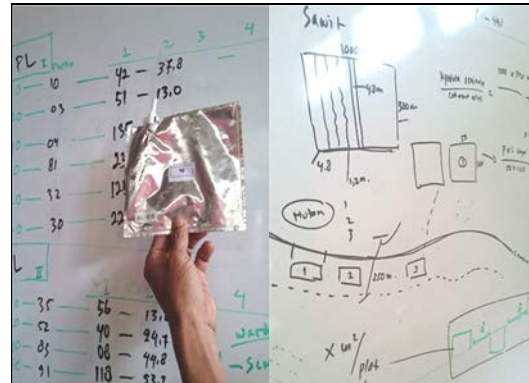
<sup>3</sup> That is, an integrated system of Measuring, Reporting, and Verification, that would scientifically assess volume of greenhouse gas, facilitate reduction of emissions, and be the basis for ensuring effective environmental management measures.

In light of the above, this project is evaluated to be satisfactory.

## 1. Project Description



Project Location



Ecological analysis of peatland by using a reagent

### 1.1 Background

There has been rapid, intensive development of marshland in Indonesia since the end of the 20<sup>th</sup> century. As one result, tropical peatland has been destroyed, and immense volumes of greenhouse gas have been released into the atmosphere by fires and microbial degradation<sup>4</sup>. In particular, during the Suharto administration, through the Mega-Rice Project, efforts were made at agricultural reform for peatland in Central Kalimantan. But it ended in failure because the high acidity of peatland was found to be unsuitable for agricultural cultivation, and the developed area was left further desolated. In the meantime, construction of irrigation facilities led to the extraction of water from marshland areas, causing a decrease in groundwater level that raised the risk of fires. Further, in years of El Nino<sup>5</sup> wildfires, especially in peatland areas, are believed to have caused the release of large volumes of greenhouse gas into the air. Smoke haze has had the effect of damaging the social and economic welfare of local residents living near peatland areas, and the deterioration of peatland has caused serious problems of landslides during the rainy season.

The above-mentioned issues of global warming and development have been studied by university researchers in Indonesia and at Hokkaido University, specifically concerning matters of tropical peatland mainly in the peatland regions of Central Kalimantan. It was discovered that proper control of groundwater was the key to preventing peatland fires, and on the basis of this

<sup>4</sup> A majority share of the world's tropical peatland is said to be in the Southeast Asia region: 68% and of this 85% is in this country.

<sup>5</sup> The El Nino effect increases in sea surface temperature above normal year from the vicinity of the Equator and International Date Line towards the Pacific Coast of Latin America, lasts for about a year, and occurs every few years. Major occurrences since 2000 were in 2002-2003, 2009-2010, and 2014-2016.

Source (Japan Meteorological Agency: as of August 2017):

[http://www.data.jma.go.jp/gmd/cpd/data/elnino/learning/faq/elnino\\_table.html](http://www.data.jma.go.jp/gmd/cpd/data/elnino/learning/faq/elnino_table.html). (as of Aug 2017)

finding, the Indonesian government has sought to establish a strategically realizable method for achieving this.

This project has been adopted as an undertaking in the SATREPS program and was implemented with cooperation by the Japan Science and Technology Agency (JST) and the Japan International Cooperation Agency (JICA). This program undertakes joint research with institutions in developing countries on global issues such as the environment, energy, disasters, and on measures to combat infectious disease, while also contributing to the improvement of the capabilities of those institutions.

## 1.2 Project Outline

At the time of the ex-ante evaluation of the project, the preparation of a Project Design Matrix (PDM) was not required for SATREPS projects, and the basic plan for the project was agreed as stated in the Record of Discussion (R/D). Subsequently, at the time of the mid-term review, the indicators and their target values, as well as the action plan, were re-examined and revised. The evaluation was done on the basis of these revisions. At the time of the terminal evaluation, an agreement was reached in accordance with the revised basic plan, project purposes and each achievement for output as per the conventional PDM. Because no overall goal had been set for the project, the project impacts were taken up at the time of the terminal evaluation. The ones which could be positioned as working to achieve “utilization of research outcome” were considered to be “expected impacts (overall goal)”, and the situation for those after completion of the project was confirmed. What to set as the “expected impact” was determined by the evaluator, and not formally agreed upon by concerned parties on both sides of the project and therefore was not taken into account in judging the degree of accomplishment of an overall goal but was separately verified, provisionally, as part of the impact.

Overall Goal	Not specified	
Project Purpose	Peat-forest management method to reduce carbon emission is developed	
Output(s)	Output 1	Fire Detection and Fire Prediction System are established
	Output 2	Carbon Assessment System is established
	Output 3	Carbon Management System is established
	Output 4	Integrated Peatland Management System is developed
Total cost (Japanese Side)	384 million yen	
Period of Cooperation	November 2009 – March 2014	
Implementing Agency	At start of project (R/D signed) the National Standardization Agency of Indonesia (BSN) At completion of project: Agency for the Assessment and Application of Technology (BPPT)	
Other Relevant Agencies / Organizations	University of Palangkaraya (UPR) (Primarily engaged in Output 3) Indonesian Institute of Sciences (LIPI) (Primarily engaged in Output 2) Indonesian National Institute of Aeronautics and Space (LAPAN) (Primarily engaged in Output1) Forestry Research and Development Agency (FORDA) <sup>6</sup> Note: It was expected that all the institutions would be involved in Output 4	
Supporting Agency/Organization in Japan	Supporting Organization in Japan: Hokkaido University Cooperating institutions: Ehime University, University of Tokyo, Japan Aerospace Exploration Agency (JAXA)	
Related Projects	[Technical Cooperation] - Forest Fire Prevention Project by Initiative of People in Buffer Zone (2006-2009) - The Project for the Support on Forest Resources Management through Leveraging Satellite Image Information (2008-2011) - Project for facilitating the implementation of National Forestry Strategic Plan (2009-2012) - Program of Community Development of Fires Control in Peat Land Area (2010-2015) - Indonesia-Japan Project for Development of REDD+ Implementation Mechanism (IJ-REDD+) (2013-2016)  [Others (private sector partnership)] Governmental Commission on the projects for ODA overseas Economic Cooperation in FY2013 - Project Formulation Survey for Dissemination of the Real-time Monitoring System Using a Mobile Communication Network in the Republic of Indonesia Verification Survey with Private Sector for Disseminating Japanese Technologies in FY2015 - Survey on Real-time Monitoring System (SESAME system) for Improving Data Collection Efficiency for Multipurpose Dam Management and Climate Change Countermeasures in the Republic of Indonesia	

<sup>6</sup> After completion of the project, the Widodo administration starting in Oct 2014, combined the Environment and the Forestry ministries to form the Ministry of Environment and Forestry, and FORDA that had been under the Forestry Ministry was reorganized under the Ministry of Environment and Forestry, and at the time of the ex-post evaluation had been renamed FOERIDA.

### 1.3 Outline of the Terminal Evaluation

The project purpose as stated in the ex-ante evaluation sheet and the terminal evaluation report, “construction of a model for fires and carbon management in peatland forest areas,” was defined as to make clear “the carbon balance in peatland forests (carbon emissions and absorption),” study of measures and methods for proper control of peatland forests, share the information, measures and methods acquired with the Indonesian government and the international community, and build an institutional framework for contributing to concerted efforts to mitigate global warming.

Four indicators for this were adopted and are as follows. (1) Clarification of the carbon balance in peatland forests (carbon emissions and absorption), (2) Investigation of methods and means for appropriate management of peatland and forests, (3) Establishing a system for sharing information, methods, and means with the Indonesian government and international community, and (4) Building a system by the counterpart for mitigation of global warming.

Regarding indicators (1) and (2) there had been planning in coordination with the content of the project activities. However, as for indicator (3) and (4), despite that there were no specific activities assigned under the indicators as well as no guideline given as to how to achieve the objectives, those indicators were set to be accomplished during the project period.

#### 1.3.1 Achievement Status of Project Purpose at the Terminal Evaluation

The terminal evaluation states that “it is expected that the project purpose will be accomplished by the time of project completion. However, it is believed that accuracy was lost because it was judged that the project purpose of building “a model” was misinterpreted to be establishing “methods” instead. It was deemed that lack of clarity of the plan caused this issue of lack of accuracy.

#### 1.3.2 Achievement Status of Overall Goal at the Terminal Evaluation

No overall goal was set at the time of the ex-ante evaluation. However, two points were indicated as goals to be achieved at the time of project completion in line with an engaging utilization of research outcome, namely (1) the building of a carbon reduction model that would contribute to promoting REDD+ in Indonesia, and (2) actual deployment of an MRV system for peatland<sup>7</sup>. In addition, in the terminal evaluation, the range of “impact” of joint public-private research activities derived from research work of the project, indicated a deepening of bilateral relations between Indonesia and Japan.

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<sup>7</sup> This is the major issue in carrying out the work of REDD+ in Indonesia. To assess actual volume of emission, it requires regularly scheduled monitoring of the status of peatland and forest reduction and degradation (change in area and in carbon storage volume). It is widely recognized that monitoring is effectively done by remote sensing plus surveys on the ground, but attention must be given to many issues in order to establish a feasible means of accurately monitoring of the widespread area at the national or regional level.

### **Building a model of a carbon reduction system, in contribution to the promotion of the Indonesian REDD+ program**

The outlook for achievement was not discernable at the time of the terminal evaluation. It was intended that in conjunction with Output 1, Fire Detection and Fire Prediction System was to be established, and Output 3 Carbon Management System was to be established, it would be able to build a practical-use model. At the time of the ex-post evaluation, as the way towards accomplishing utilization of research outcome was postulated as seeking promotion of REDD+ through peatland remediation in Central Kalimantan through the practical application of each output in regional society.

### **Introduction of an MRV system for peatland**

At the time of the terminal evaluation, the outlook for achievement by the time of project completion was not discernable at the time of project completion. Concerning the research results for Output 2, Carbon Assessment System is Established, which was to be an important part of the MRV System, the outlook was that there would be the establishment of an evaluation system workable in the project area where the actual measurement was possible. In the ex-post evaluation, it was expected that in the event that an MRV System was put to use, the final user would be the present Ministry of Environment and Forestry that is in charge of REDD+ in the central government.

#### 1.3.3 Recommendations from the Terminal Evaluation

<b>Points for caution in explaining project outputs</b>
Their understanding of the project results is not enough so that it does not reach the stage to utilize them for policy/decision-making process. Thus, it is necessary to translate the peat-forest management method and MRV system for policy-formulators to understand easily in order to apply the research outcomes. It is also recommended that the project will prepare official brief policy paper to policy/decision makers.
<b>Consideration of both project goals and socio-economic aspects</b>
Simulating future land use change is one of the major concerns of the provincial government of Central Kalimantan. In that context, the team would like to re-emphasize the importance of the socio-economic aspects to achieve the project purpose, i.e. "development of peat-forest management method to reduce carbon emission.
<b>Specific aspects of users of project outputs and preparation of a manual</b>
The organization which will take over each project outcome after the project should be designated, and the operation manuals of activities, e.g. peat-fire control and tree planting, should be prepared by the end of the project.

### Re-confirmation of information and data regarding degree of attainment of each indicator

As examined the achievement of the indicators set by the PDM for the project, the team found that the achievements of some quantitative indicators are not well verified and recommended that preparations be made for the achievement of the quantitative indicators by the end of the project.

### Thoroughness related to management of supplied equipment materials

The evaluation team confirmed the utilization and maintenance of research equipment provided by the project was considered largely appropriate. Some of the equipment that had transported from Japan was not on the list of the equipment. The team hence requested to add the equipment to the list immediately.

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Miho KAWAHATSU, OPMAC Corporation

### 2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: September 2016 to January 2018

Duration of the Field Study: January 2, 2017 to January 17, 2017

May 1, 2017 to May 8, 2017

## 3. Results of the Evaluation (Overall Rating: B<sup>8</sup>)

### 3.1 Relevance (Rating: ③<sup>9</sup>)

#### 3.1.1 Consistency with the Development Plan of Indonesia

At the time of the ex-ante evaluation, although Indonesia had not taken on an obligation to reduce the emission of greenhouse gas, in 2007 at the COP13 meeting of the United Nations Framework Convention on Climate Change (UNFCCC) declared its adoption of the *National Action Plan Addressing Climate Change* as its international commitment to curb the emission of the gas. Further, reflecting the strategic importance of the peatland areas of Central Kalimantan, that is the object of this project, in 2007 the *Presidential Decree No. 2/2007 on the Acceleration of Rehabilitation and Revitalization of the Peatland Development in Central Kalimantan* was issued and a major initiative at restoring peatland in Central Kalimantan was begun. At the time of project completion, in 2009 at COP15, President Yudhoyono announced continued support for the reduction of greenhouse gas by 2020. In 2011 including “natural forests and peatlands” as its target<sup>10</sup>, *Presidential Decree No. 61/2011* established a national

<sup>8</sup> A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

<sup>9</sup> ③: High, ②: Fair, ①: Low

<sup>10</sup> There is not necessarily internationally common consensus on making peatland an objective of REDD+ but in Indonesia’s REDD+ strategy it is clearly stated that “natural forests and peatlands” is an objective.

action plan for reducing the generation of greenhouse gas, *Rencana Aksi Nasional Penurunan Emisi Gas Rumah Kaca (RAN-GRK)*, and each provincial government formulated its own plan (*Rencana Aksi Daerah Penurunan Emisi Gas Rumah Kaca (RAD-GRK)*). With the growing awareness of the strategic importance of effective management of peatlands, the nation strengthened its state implementation arrangements to deal with the issue, as *Presidential Decree No. 62/2013* of 2013 enabled the REDD+ agency to be established. Further, in Central Kalimantan Province, acting according to a directive of the REDD+ agency, it took the initiative and declared it to be a pilot province for REDD+<sup>11</sup>.

From the time of the ex-ante evaluation to project completion, in terms of achievement of the reduction target of greenhouse gas in Indonesia as state development policy, the importance of peatland management and, in particular, the regional importance of Central Kalimantan Province where peatlands are widely distributed, was addressed. Thus, this project is highly consistent with Indonesia's national policy.

### 3.1.2 Consistency with the Development Needs of Indonesia

At the time of the ex-ante evaluation, there had been many forest fires around the nation caused by the conversion of the use of forest land to agriculture and large-scale development of oil palm plantations. As a result, there was a serious decrease in the area of forest land and awareness of the gravity of the large-scale release of greenhouse gas into the atmosphere had risen. The country's emission of greenhouse gas, considering the influence caused by the deforestation and changes in land utilization, made Indonesia the third-greatest source of the gas, after the USA and China, and more than 80% of the emission was caused by a fire in forest and peatland areas. Also, at the time of the project completion, there were human-caused fires during the dry season, as well as the fire-causing effect of El Nino. In particular, the fires caused after the completion of the project by cyclical El Nino effects in 2015 were a disaster of hitherto unexperienced proportions; as much as approximately 250 ha of forest and peatland burned.

From the ex-ante evaluation to the completion of the project, the development need of peatland management was consistently high. Particularly in Indonesia, the need for the recovery of fragile fire-prone peatland and the carbon management has been at an all-time high and they have even grown into more serious problems.

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<sup>11</sup> In 2010 Indonesia formed its National REDD+ Task Force, and in 2012 the Task Force selected Central Kalimantan as the pilot area. Source: <http://theredddesk.org/countries/indonesia> (as of August 2017).



### 3.1.3 Consistency with Japan's ODA Policy

In Japan's Official Development Assistance Charter as formulated in 2003, while basically positioned on the viewpoint of "human security" it took up the matter of the coexistence of the environment and development, as the basic principle for the provision of development aid. In the Country Assistance Program for Indonesia, formulated in November 2004, protection of the environment was included in one of the priority subjects of "building a democratic and fair society." With international concern over global environmental issues and especially climate change increasing, the *Country Assistance Policy for Indonesia* (in April 2009) in the priority aid section for "environment" and the development subject "environment" had "Assistance Program for Countering Climate Change" and "Cooperation Program for Environmental Protection" whereby a comprehensive approach was planned to be demonstrated. Therefore, at the time of the ex-ante evaluation, the project was consistent with Japanese aid policy.

### 3.1.4 Appropriateness of the Project Plan and Approach

In connection with the building of an MRV system for the peatlands, a final goal of the project, because of the need for measuring and monitoring work in the field over a period of years, and joint research to scientifically elucidate relevant phenomena through validation in Indonesia, it is believed appropriate for implementation of the project to be included in SATREPS as one that initiated support for joint research work with personnel of the implementing agency. However, as stated in section 1.3, Outline of the Terminal Evaluation, some of the indicators of achievement of the project did not include specific activities, an implementation schedule, and so on, and allocation of responsibility in the organization was not clear. Because research institutions were implementation bodies, it may be that there was a confusion between their own research goal to be realized in the medium to long-term, and the project purpose which was to be accomplished within the project period. Further, in addition to the situation of testing of hypotheses through trial and error in conventional research activity, and the presumption that the trajectory of a research plan had been adjusted in accordance with acquisition of quantitative data, considering that in the present field, in particular, the possibility of forecasting conditions in the country and elsewhere in the framework of climate change is low, it is understandable that it is difficult to obtain an outlook for the achievement of the project purpose.

In view of the above, the implementation of this project conforms to development policy based on Indonesia's international commitments, the development needs related to the recovery of peatlands and carbon management, as well as Japanese ODA policy. Moreover, regarding the appropriateness of the project's plan and approach and so on, while there was a need for

specificity in the plan of activities for autonomy and sustainability of the local implementing agency, in this field, the implementation of the project through joint research was appropriate. Therefore, relevance is high.

### 3.2 Effectiveness and Impact<sup>12</sup> (Rating: ②)

#### 3.2.1 Effectiveness

##### 3.2.1.1 Project Output

Because it was indicated in the terminal evaluation report that in the implementation of this project it was necessary to ① verify the carbon dioxide flux<sup>13</sup>, and its density ② make observations of hotspots<sup>14</sup>, ③ undertake a mapping of forest degradation and inhabitant species, ④ ascertain the deforestation and decrease of biomass, ⑤ ascertain groundwater level and soil water, ⑥ identify peat domes<sup>15</sup> and estimate the thickness of the peat layer, ⑦ determine the peat subsidence and ⑧ determine the amount of water-soluble organic carbon, the effectiveness of the project is judged based on the achievement of the related activities of results of data measured and analyzed of the 8 elements together with implementing agencies in Indonesia by the project completion, as they were aligned under each output. As a result of the collection of information from questionnaire responses from the implementing agency and interviews, the status of achievement of each output was as follows at the time of project completion.

#### **< Output 1 > Fire Detection and Fire Prediction System<sup>16</sup> are established**

For actual application of the system in Indonesia, a policy measure must be adopted by the Central Kalimantan government, and although there are unresolved issues, from the viewpoint of the building of a technical system mostly using algorithms and design of a tool based on it, the output has almost been achieved.

#### **< Output 2 > Carbon Assessment System<sup>17</sup> is established**

Although at the time of project completion there had been validation regarding the assessment of carbon volume generated by fires, this was not at the stage of completion. The Indonesian response was that there had been insufficient efforts regarding the influence of the system on the ecosystem. As for this output, research is being continued and an assessment model is being created based on collected data, but the initial target value was

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<sup>12</sup> Sub-rating for Effectiveness is to be put with consideration of Impact.

<sup>13</sup> Measures movement of CO<sub>2</sub> in units of hours.

<sup>14</sup> A potential place of huge volume of CO<sub>2</sub> emission such as by fire etc.

<sup>15</sup> Tropical peatland often forms domes in lowland areas.

<sup>16</sup> Methods and tools (such as maps) is to be developed for detection and forecasting of fires; these are supposed to be used in Indonesia, indicating that there is capability to engage in activity for fire detection and forecasting.

<sup>17</sup> A method is to be developed for assessing carbon balance of peatlands and/or forests (the volume of emission and storage).

not achieved at the time of project completion.

### **< Output 3 > Carbon Management System<sup>18</sup> is established**

In connection with verification of groundwater level, it is believed the output has been achieved as a result of empirical research using the SESAME system<sup>19</sup> (a system for transmission of field data) developed by a Japanese company. Regarding development of a vegetation remediation plan and a fire prevention strategy, however, considering that those issues had not yet been incorporated in the local implementation arrangements, the objectives were not achieved, so some issues remained outstanding regarding the manifestation of effects.

### **< Output 4 > Integrated Peatland Management System is developed**

The definition of “foundation for comprehensive carbon management” and standard for judging the degree of accomplishment have not been made clear. Regarding judgment of the degree of accomplishment of this output, therefore, the basis for judging activities related to the status of Outputs 1, 2, and 3 at the time of project completion, for sustaining the “foundation” indicated as the content of Output 4. From this viewpoint, since the operation and maintenance of a database and so on had been halted, some issues remained outstanding from the time of terminal evaluation to the time of project completion. Nevertheless, a start has been made during the project period at building a model that, by means of this project, would attempt to assess emission volume based on the correlation between carbon emission volume and the level of groundwater, research and development of which was confirmed ongoing at the time of the ex-post evaluation, so there has been the partial accomplishment of this output.

#### **3.2.1.2 Achievement of Project Purpose**

At the ex-post evaluation, the relationship of each output and project purpose was realigned as shown in Figure 1. Output 4 was presumed to establish a comprehensive system incorporating the above-mentioned Outputs 1, 2, and 3. As assumed to be the next step from Output 3, Output 4 contains “introduction of a fire system for peatland and forests and carbon control system are to be included in policy formation and institution building processes,” but specific activities for this were not in the basic plan. Further, when a check was made with

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<sup>18</sup> A carbon management system (to curb the emission) is to be established by the partnership with related parties such as local administration, research institutes, communities through information collection and data analysis of vegetation activities on a trial basis.

<sup>19</sup> There is a telemetric system using cloud services that collect field data by use of sensors for groundwater, rainfall and so on, recording the data on the spot, transmitting data by means of a mobile telephone network to a server installed at some remote location, recording the transmitted data and outputting it for analysis, and sending the results to a client computer. Particularly, it enables to show data in real time as graphs and maps, providing benefit in displaying the result of broad-area monitoring at a distant location.

the implementing agency on the Indonesian side, it was found that no substantial action has been taken in this regard during the project.

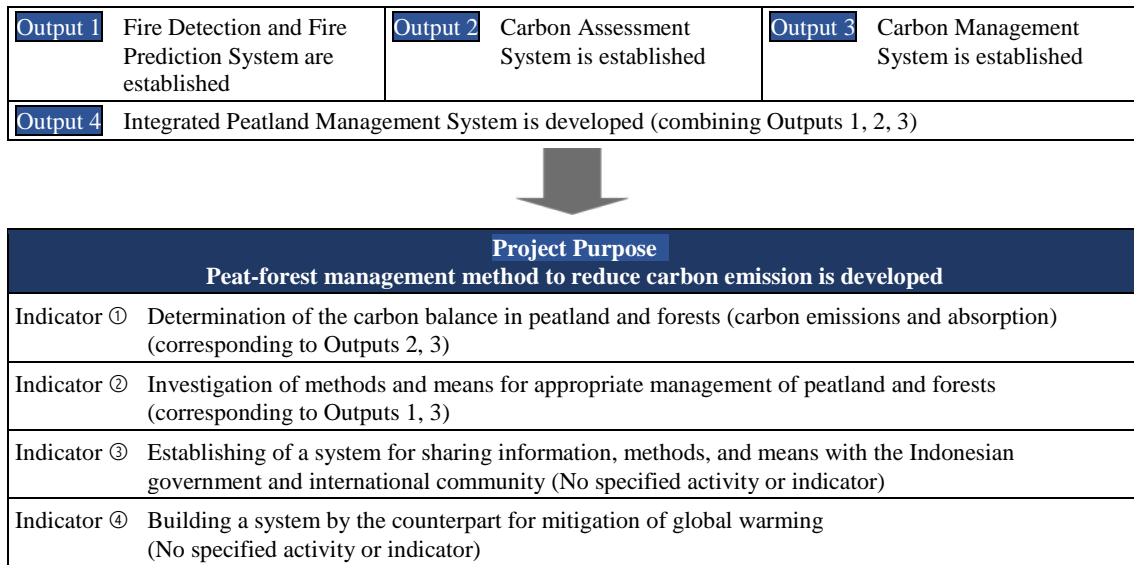


Figure 1: Relationship of Project Outputs to Project Purpose

According to results of questionnaires sent to the University of Palangkaraya and other implementing agencies regarding accomplishment of project purpose, there were a number of issues requiring verification in the “peatland and forest fire and carbon management model,” indicating that the model was still in the stage of development. In particular, research issues remained concerning the magnitude of the carbon balance and peatland fires. However, as stated above for Output 4, progress during the project in research on assessment of the volume of carbon emission was in the process of clarifying the effectiveness of the methodology. Further, as stated for Outputs 1, 2, and 3 although progress to the stage of actual use had not been made, there had been multifaceted, tangible research on the above-mentioned eight elements that were subjects of project research for validation of carbon management and assessment. Therefore, it is believed that in relation to project Indicators ① and ② goals had been accomplished.

As described above, in the case of Indicators ③ and ④, specific activities and indicators for evaluation had not been included in the plan. Further, these indicators are essential not only for Central Kalimantan Province but also for objective policy formation by the central government and it was also confirmed that because the organizational mission of the implementing agencies of the project is primarily on research, it was inherently on a different dimension from such activities, specific activities thus were neither carried out nor planned. Therefore, it is considered that related issues had not been accomplished with regard to Indicators ③ and ④.

Table 1: Achievement of Project Purpose

Purpose	Indicator	Achievement
Peat-forest management method to reduce carbon emission is developed	Indicator ① Clarification of the carbon balance (emission volume and absorption volume) in peatlands and forests	During the project, activities related to Outputs 2 and 3 engaged in the main validation. Although a model for the mechanism of the carbon balance in the target region had not been built by the time of completion, valuable information had been collected and analyzed through the activities, so there was a partial achievement.
	Indicator ② Investigation of methods and means for appropriate management of peatland and forests	Validation was done from the viewpoint of recovery of vegetation and prevention of fires, mainly through activities for Outputs 1 and 3 in the target region.
	Indicator ③ Establishing a system for sharing information, methods, and means with the Indonesian government and international community	The planned activities were not performed during the project and a system for sharing was not established.
	Indicator ④ Building a system by the counterpart for mitigation of global warming	The planned activities were not performed during the project and a system for mitigation of global warming was not built.

As stated above, because there were indicators with no specific planned activities required for the project purpose, it was difficult to fully achieve the purpose by the activities done for the project. Thus, some parts of the project purpose were not achieved.

### 3.2.2 Impact

The evaluation was done by taking up the content of the lessons learned in the terminal evaluation as the shared understanding of the concerned parties and with the evaluator's use of "expected impact" in place of an overall goal. Because the project did not specify an overall goal, the degree of achievement of the "expected impact" was not added to the evaluation judgment.

In SATREPS projects, not only to have the academic achievement, but it is also required that there be an approach to the utilization of research outcome in the overall goal or expected impact, but as stated in section 1.2, Project Outline, above, there was no overall goal set for this project. However, as stated in section 1.3.2, Achievement Status of Overall Goal at the Terminal Evaluation, although not specified the timeframe for the achievement, "Building a model of a carbon reduction system, in contribution to the promotion of the Indonesian REDD+ program" and "Introduction of an MRV system for peatland" were indicated to be objectives to aim for, and hence were provisionally used as the overall goal of the project and the status of their achievement was verified for the ex-post evaluation.



### 3.2.2.1 Achievement of Overall Goal (For reference)

As stated above, although no overall goal had been set for the project, of the impact given in the terminal evaluation, “Introduction of an MRV system for peatland” and “Building a model of a carbon reduction system, in contribution to the promotion of REDD+ in Indonesia” that can be positioned as being an approach to “utilization of research outcome” were provisionally verified as the equivalent of an overall goal.

First of all, “Introduction of an MRV system for peatland” is provisionally taken as the establishment of an effective MRV system that can confirm from a scientific standpoint effort at advances in carbon reduction by the utilization of the REDD+ framework. From this perspective, by means of activities primarily for Output 2 of the project, using the “carbon assessment model” developed by a combination of the model of forecasting groundwater levels and data of actual groundwater levels obtained by use of the SESAME system, the research stage has been reached at which it is possible to quantifiably assess the effect of carbon reduction when the water level is being managed to maintain it at a certain level. The project’s implementing agency is participating in the Indonesia Japan Project for Development of REDD+ Implementation Mechanism: IJ-REDD+<sup>20</sup>, now being implemented as a technical cooperation project. With actual execution in mind, a manual<sup>21</sup> has been drafted and training has been carried out for strengthening the capability of MRV at the level of the province.

On the other hand, the “Building a model of a carbon reduction system, in contribution to the promotion of the Indonesian REDD+ program” is being implemented by the above-mentioned IJ REDD+ in West Kalimantan Province; it is not limited to the peatlands targeted by the project, but rather has the general framework for forest management in Indonesia and is not directly related to Output 3 of the project.

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<sup>20</sup> In order to utilize the international framework of REDD+ to the maximum extent, and to contribute to efforts for Indonesia’s achieving its greenhouse gas emission reduction target, this technical cooperation project aims at working to operate and institutionalize REDD+ mechanisms at the provincial level, by developing methodology for limiting forest shrinkage and degradation, through demonstration in the field by giving support for building workable REDD+ mechanism in West Kalimantan Province and Central Kalimantan Province. With the intent that the results of that is expected be reflected at the central government level in the national REDD+ mechanism. From the viewpoint of the follow-up of the SATREPS project, collaboration is continued to be made for the Output 4 “Strengthening the capacity for MRV in Central Kalimantan” of the related technical cooperation project.

<sup>21</sup> IJ REDD+ Project, Guidebook for Estimating Carbon Emissions from Tropical Peatlands in Indonesia, Feb. 2016.

Table 2: Degree of Achievement of Expected Impact

Expected Impact	Present status
Actual use of an MRV system for peatland	<ul style="list-style-type: none"> <li>- Regarding Output 2, at the time of the ex-post evaluation, a manual etc., for measuring carbon emissions at the level of the province had been made as a part of the specific activities of the technical cooperation project Indonesia-Japan Project for Development of REDD+ Implementation Mechanism (IJ-REDD+).</li> <li>- Through 2018, the research result of this project will be evolutionarily used in the current extension phase of IJ-REDD+. There are scientifically unresolved issues, however, regarding the evaluation of the carbon emission volume caused by peatland fires, and it is planned to be validated by using methods such as PALSAR.<sup>22</sup></li> </ul>
Building a model of carbon reduction system, in contribution to the promotion of the Indonesian REDD+ program	<ul style="list-style-type: none"> <li>- Regarding Output 3 of the project, ever since the disastrous tropical peatland and forest fires in August 2015 in Central Kalimantan, details of organized activity at the implementing agency for the method of measurement of reduction of carbon emission have remained obscure. However, all researchers at the implementing agency are monitoring the condition of the peatland and continuing their studies.</li> <li>- It was reported that as the cause for interrupting activities other than natural disasters, according to the response from the implementing agencies, as for the establishment of a method of reducing carbon, despite the need for active mobilization of local stakeholders in Central Kalimantan, in the absence of a person responsible for implementation or a leader, it was difficult to carry out such social services without payment.</li> <li>- There was no response to the situation implied by the recommendation in the terminal evaluation that “the organization which will take over each research component after the project should be designated, and the operation manuals of activities, e.g. peat-fire control and tree planting, should be prepared by the end of the project,” and it was not possible to ascertain the status by field study.</li> </ul>

Source: Questionnaires returned from the implementing agencies, and interviews

Development is proceeding for application of an MRV system for peatlands that was being tested in Central Kalimantan Province, as the pilot region. Meanwhile, there has been hardly any progress since the completion of the project entailing building a model of a carbon reduction as a contribution to the promotion of the Indonesian REDD+ program and organized activity has not been confirmed.

In light of the above, the overall goal that has been provisionally set for verification has not been partially achieved.

### 3.2.2.2 Other Positive and Negative Impacts

#### (1) Impact on the natural environment

No impact has been confirmed at the time of both the terminal evaluation and the ex-post evaluation. Observation equipment such as a flux tower has been installed during the project, but this is within the premises of the implementing agency and has not had any effect on the natural environment. Also, there were boring surveys to substrate levels of peatland during

<sup>22</sup> Phased Array type L-band Synthetic Aperture Radar (PALSAR) equipment is installed in the Japanese satellite Daichi. It uses a mechanism that penetrates clouds to make observations to acquire ground-level information, and is thought to have the ability of determining change in forests tropical regions. Analysis of PALSAR data uses sophisticated technology and by the development of a monitoring method supplementing optical sensor data is expected to contribute to the advance of REDD+.

Source: <http://www2.ffpri.affrc.go.jp/labs/palsar/index.html> (as of August 2017).

the project, with no negative influence on the natural environment.

(2) Relocation of residents; land acquisition

Because the project was realized on the existing premises of the implementing agency, no residents were relocated and no land was acquired. Because there were no activities having a negative influence on residents of the subject area, there was no need for explanations for local people.

(3) Improvement of water management by the SESAME system

According to the interviews at BPPT, equipment produced in Indonesia based on the concept of the SESAME system for water level observation in this project are being utilized in various places in Indonesia as the BPPT-SESAME System for visualization of hydrological data and as shown in the photos below. Hydrological data is sent in real time from rural areas to the BPPT head office in Jakarta where it is displayed, enabling visualization of the water level and its change in various places in Indonesia. According to BPPT, the equipment is installed at the major dams<sup>23</sup>, making visualization of water levels possible, helping to both optimize water management and the efficient distribution of agricultural and domestic use of water.

Further, when a questionnaire survey<sup>24</sup> directed at the 18 Indonesians doing research work for the project at the implementing agency was made although there is variation in opinions depending on the research field, most of them agreed on the point that the quality of the plan for management of groundwater in peatlands, and natural resources, and land use had been improved. Further, almost all agreed that general interest in peatland management had risen, and the reason for this was the increased publication of scholarly papers by the Indonesian researchers. Especially it was deemed that individual researchers who had obtained a degree by publishing papers were influenced in terms of their career paths and motivation. It has thus contributed to the continuation of research work after the project completion.

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<sup>23</sup> The SESAME system has been introduced at Jatiluhur dam located in a suburb of Jakarta, the largest dam in Indonesia.

<sup>24</sup> Questions were posed to the Indonesian side whether any impact was perceived through the project from 3 major perspectives with regard to the peatland summarized by the ASEAN secretariat: policy and institutional issues / community based issues / peatland management issues).

Source: <http://www.aseanpeat.net/index.cfm> (as of February 2017).





<BPPT-SESAME installed in the vicinity of Palangkaraya in Central Kalimantan>

As for the project purpose, although there were no planned activities regarding the establishment of a system by the counterpart for sharing information, methods, and means among the Indonesian government and the international community, and building of a system for prevention of global warming, so that these were not realized, during the course of the project, the progress of studies is elucidating the assessment of carbon emission, and multifaceted and specific investigation of carbon management methods has been made, whereby it can be thought that there has been some achievement. Thus, effectiveness is fair. It was confirmed that as positive impact there has been, inter alia, the nationwide use of the SESAME system of water management and increased recognition through scholarly contributions by Indonesian researchers.

The manifestation of certain effects of implementing the project is confirmed and it is judged that the effectiveness and impact are fair.

In verifying the achievement of the provisional overall goal, while activities from the project implementation have been continued, and the progress was observed in building a model of a carbon reduction system that would be a contribution to the advancement of REDD+, and efforts were made at the application of an MRV system for peatlands, it is however judged that the overall goal has not reached its target itself.

### 3.3 Efficiency (Rating: ②)

#### 3.3.1 Inputs

Project inputs (planned and actual) are as shown in the table below.

Table 3: Inputs of the Project (Plan and Actual)

Inputs	Plan	Actual
(1) Experts	1 Long-Term expert 94 Short-Term experts	Total expert dispatch (148.7MM) - 2 Long-Term experts - 239 Short-Term experts - Breakdown by activity: Output 1: 426 days Output 2: 310 days Output 3: 2,488 days Output 4: 1,237 days
(2) Trainees received	3 persons/year	20 persons - JICA counterpart training • Long-term: 5 persons (Ph.D. course: 3 persons, Master course: 2 persons) • Short-term: 10 persons - Breakdown by the organization: UNPAR (6 persons), LIPI (5 persons), BSN (1 person), BPPT (4 persons), LAPAN (2 persons), FORDA (1 person), Central Kalimantan Government (1 person)
(3) Equipment	N.A.	Procurement in Japan: 31 million yen Procurement in Indonesia: 59 million yen
(4) (Others)	N.A.	71 million yen (major items are: purchase of PCs and Cameras, Airfare, Allowance, Accommodation fee, Outsourcing etc.)
Japanese Side Total Project Cost	215 million yen	384 million yen
Indonesian Side Total Project Cost	N.A.	Allocation of Counterpart Personnel: UPR, LIPI, LAPAN, BSN, BPPT, FORDA Local cost: Running costs for office use (e.g. costs for water, electricity and landline phone, internet), and administrative operating cost for the project (travel cost and allowance)

\* MM stands for man-month.

Source: Ex-ante evaluation sheet (Aug. 2009), Terminal Evaluation Report (February 2014) and survey results from the implementing agencies

### 3.3.1.1 Elements of Inputs

There was a substantial increase in the number of people for the short-term dispatch of research experts than planned. The composition of the total number of days spent for each activity shows that Output 3 accounted for the greatest length of time during such dispatches. According to interviews with a long-term dispatched expert, the transportation of firefighting hose (about 3,000 in number) from Japan and boring surveys to the layer below the substrate were the activities not in the original plan. Although there was no increase in the outputs from such activities it was reported that the nature of activities for Output 3 of the project promoted a more concrete image among local stakeholders.



Concerning the content of training of trainees, and roles and contributions regarding each output of the project, at the implementing agency, there were many researchers who previously had had the experience of studying at Hokkaido University, and ordinarily there was smooth communication between research experts of the project who are academic advisors and the long-known researchers, that performed a role in making joint work more efficient.

#### 3.3.1.2 Project Cost

Project cost exceeded the planned amount by a wide margin, owing to the dispatch of more short-term experts than that had been planned, as well as research activities and the cost of shipping fire hose for firefighting activities that had not been anticipated at the outset. Although the procurement of additional materials, in particular, may have had the effect of making local activities more specific and thus easier to share the image at the sites in Kalimantan, it is not judged that the increased costs rightly matched the output. As for acceptance of trainees, it is thought that from the viewpoint of ensuring the continuation of research work and maintaining sustainability, the effects of acceptance by the form of obtaining of higher degrees are considered high.

Whereas the amount of the project cost was planned to be 215 million yen, the actual cost was 384 million yen. It was significantly higher than the planned amount (178% of the planned amount).

#### 3.3.1.3 Project Period

The project was implemented from November 2009 to March 2014 as planned (100% of plan).

As indicated above, although the project period was within the plan, the project cost exceeded the plan. Therefore, the efficiency of the project is fair.

### 3.4 Sustainability (Rating: ③)

#### 3.4.1 Related Policy and Institutional Aspects for the Sustainability of Project Effects

International commitments of the Indonesian government concerning the reduction of greenhouse gas, at the time of the ex-post evaluation, is expressed in the *Intended Nationally Determined Contribution, 2015-2019 (INDC)* submitted to the UNFCCC the *National Determined Contribution (NDC)* after the ratification of the Paris Agreement<sup>25</sup> meeting in

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<sup>25</sup> The remarkable point of the REDD+ mechanism as per the Paris Agreement of 2016 is that while in CDM emission reduction credits are given only for the net increase in reduction caused by afforestation or forest remediation, it addresses an arrangement where credits are also given to the result of control in deforestation, which incentivizes developing countries to proactively participate such as Indonesia that has vast areas of forest.

November 2016 and the *Biennial Update Report (BUR)* in 2015 all of which are consistent in this respect and consists of a target of 26% reduction the volume of greenhouse gas emission by the nation's own efforts by 2020, and a reduction of 41% if assistance is received from abroad. Further, as disclosed policy related to the project, in November 2015 President Joko Widodo made a speech at the heads of state meeting at COP21. Regarding the importance of measures for the recovery of peatlands, more than 80% of the natural disasters afflicting Indonesia are related to climate change, and the tragedy in the forest and peatlands in 2015 as mentioned above is viewed as having been caused by fires that originated in extraordinary weather conditions caused by El Nino, and this has indicated the necessity for all countries to unite in confronting climate change. As for the target reduction, President Widodo has stated it will be achieved by the promotion of the peatland control measures.<sup>26</sup> As a specific measure, the president established the Peatland Restoration Agency (BRG), that was given direct control over the restoration of peatland degraded by forest and peatland fires in Sumatra and Kalimantan, and of the management and use of peatland. Assistance has been received from a Norwegian government fund<sup>27</sup> the BRG was established under the Ministry of Environment and Forestry for the limited period of 2016 to 2020. The REDD+ Agency, established under the previous administration in 2013, was merged into the Ministry of Environment and Forestry when the government ministries were reorganized in keeping with a change of the administration, and at present the locus of responsibility for policies and implementation related to REDD+ is the Directorate General of Climate Change Control of the Ministry of Environment and Forestry.

As stated above, at the time of the ex-post evaluation, as peatland control within a framework of promotion of REDD+ is an urgent policy agenda in Indonesia, through the efforts of establishing the MRV system for peatlands in the project, it is expected to visualize the results of the measures for climate change comprehensively as well as objectively. As such it continues to be an important maneuver for Indonesia to benefit fully from the prospective REDD+ mechanism.

### 3.4.2 Organizational Aspects for the Sustainability of Project Effects

As shown in the table below, the responsible implementing agency changed at the time of planning, ex-ante evaluation, terminal evaluation, and ex-post evaluation. However, the above changes did not cause any real confusion in terms of the implementation of the project as the

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<sup>26</sup> An increase of 23% by 2025 of the ratio of renewable energy to electric power is included.

<sup>27</sup> The Letter of Intent (LOI) signed by the Norwegian and Indonesian governments states that for several years starting in 2010 up to 1 billion USD will be provided, in accordance with results of an activity for reduction of greenhouse gas emission generated by forest degradation and emission from peatlands.

Source: [https://www.regjeringen.no/globalassets/upload/SMK/Vedlegg/2010/Indonesia\\_avtale.pdf](https://www.regjeringen.no/globalassets/upload/SMK/Vedlegg/2010/Indonesia_avtale.pdf) (as of February 2017).

transfer of principal investigator was made between the implementing agencies. Although there were some changes of the names of the cooperating agencies, basically it was the same institution and, further, because the project site was Palangkaraya in Central Kalimantan, the actual research activities in terms of the outputs of the project, were continued to be engaged by UPR researchers throughout the project.

Table 4: Organizational change of the implementing agencies, and of its name

	<b>Ex-Ante evaluation</b>	<b>Terminal evaluation</b>	<b>Ex-Post evaluation</b>
Responsible agency	BSN (as of the signing of an R/D)	BPPT (changed as a principal investigator was transferred from BSN)	RISTEK (Ministry of Research, Technology and Higher Education) BRG
Cooperating agency	- UNPAR - LAPAN - LIPI - FORDA	- UNPAR - LAPAN - LIPI - FORDA	- BPPT - UPR (changed from UNPAR since there is another university with the same abbreviation) - LAPAN - LIPI - FOERIDA (changed from FORDA as a merger of the Ministry of Forestry and the Ministry of Environment)

Within UPR, the Center for International Cooperation in Sustainable Management of Tropical Peatland (CIMTROP) was in charge of the project. It had been unchanged at the time of the ex-post evaluation. At present, relatively young researchers of the CIMTROP have continued doing joint research with Japanese researchers and have engaged in coordination work in Central Kalimantan Province with the above-mentioned corollary project, IJ-REDD+.



Further, LAPAN and LIPI are public entities specialized in research activities and are intent on continuing to raise the level of their foundation of research through joint projects with domestic and foreign bodies.

Moreover, the above-mentioned BRG that has the exclusive mandate for peatland recovery was established in 2016 and is intent on making use of scientific, practical research results. According to interviews at BRG, under the “3R” slogan of “Re-wetting, Re-vegetation, and Re-vitalization” it is creating institutional arrangements whereby the president himself is able to visit parts of the 2 million ha of peatland being studied, for observations every three

months<sup>28</sup>. It has exchanged memoranda with universities in and outside Indonesia doing research on peatlands, including UPR, and is working on the collection of practical, scientific data to serve peatland recovery.

In light of the above, at the time of the ex-post evaluation, the arrangements for research at the cooperating implementation agencies were being continued, and by means of establishment of a specialized entity concerned with peatland recovery, the arrangements for use of research output has been strengthened, and in general, no serious problems are observed.

### 3.4.3 Technical Aspects for the Sustainability of Project Effects

It is important, regarding technical aspects, to continue improving research activities and capabilities with an orientation toward the practical application of project outputs by the implementing agency.

At the time of the ex-post evaluation, the principal researchers concerned with the improvement of research capacity and main researchers involved in the status of its use were persons who have had the experience of studying in Japan. In order to obtain a degree by studying in Japan, they were trained in the use of analytic equipment and are already familiar with the operation and maintenance of such equipment and are using it for their current work. Further, they are currently in the position of leaders and are instructing young researchers in matters such as the methods of analysis using the equipment that has been provided. At the time of the field study for evaluation, they were continuously using a spectrometer, provided by the project and the only one at a university research center in Indonesia. It was reported that researchers from other universities have visited in order to be instructed in its use for research. Because UPR is continuing to collect data as requested for joint research with Hokkaido University, UPR can have a continuous supply of reagents necessary for analysis, and academic advice, from Hokkaido University. In 2016, after project completion, a multi-authored “Tropical Peatland Ecosystems”<sup>29</sup> by Indonesian and Japanese researchers was published as a notable academic accomplishment. Acquisition of opportunities to internationally report on research and publish would lead to success in securing funds for future research and the continuation of research activities by individual scientists.

Moreover, LAPAN, one of the cooperating implementing agencies, specializes in data from satellite observations and they have a strong belief that it is indispensable for doing international joint research with industrialized nations. LAPAN itself possesses remote sensing technology, and in line with its mandate to respond to a variety of requests from society, it provides feedback of the results of research analysis on peatland fires obtained by the project

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<sup>28</sup> According to BRG, acquisition of more than 200 sets of SESAME System equipment is planned.

<sup>29</sup> Osaki M, Tsuji N (eds.) (2016) “Tropical Peatland Ecosystems.” Springer Tokyo.

to the Indonesian National Carbon Accounting System (INCAS)<sup>30</sup> of the Ministry of Environment and Forestry. And it is recognized their role to improve the accuracy and quality of the data it supplies.

In light of the above, at the time of the ex-post evaluation, with regard to technical sustainability, through the joint research work, the capability to publish international academic papers has been improved, analytic equipment is being used independently, and maintenance capability has been augmented. Generally, there are no technical problems in terms of its sustainability of research.

#### 3.4.4 Financial Aspects for the Sustainability of Project Effects

Regarding finance, budgeting has been done for studies and activities aimed at the application of the outputs and it is important that the effects continue to be evident.

For external financing of research, the arrangement for UPR is to secure funds from RISTEK, the part of the Ministry of Research, Technology and Higher Education, that oversees university research centers. Funds are supplied in relatively small amounts and in response to applications by individual researchers, and with the exception of research subjects chosen by the national government, research fund is not provided for joint research proposed by universities. As such, with regard to the operation and maintenance of relatively expensive analytical equipment procured by the project, research funds for individual researchers are allocated. For this reason, financing of joint projects beyond a certain scale must rely on donors in Japan and foreign countries. On the other hand, at UPR a researcher, as an individual consultant, can apply for study projects commissioned by donors; in this case, that individual has a great deal of freedom. Below is a current list of funds to which UPR researchers can apply for joint research financing.

- Indonesia Climate Change Trust Fund<sup>31</sup>
- Indonesia Toray Science Foundation<sup>32</sup>
- USAID Sustainable Higher Education Research Alliances<sup>33</sup>

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<sup>30</sup> In the ICCSR roadmap for sector-wise climate change in Indonesia, written in 2010, REDD is defined as including (1) building of a national REDD, (2) reference emission level, and (3) Indonesian National Carbon Accounting System (INCAS). INCAS is vital for this context because by accumulating information and data on forest diminution and degradation of the national as well as provincial levels, and the volume of carbon emitted by peatland fires, it can add strength to capacity related to the forest carbon monitoring account. See the final report for the Project for facilitating the implementation of National Forestry Strategic Plan, from JICA, 2011, p. 3-7, p. 4-5 (in Japanese).

<sup>31</sup> A fund administered by the sole domestic Indonesian NPO officially authorized to undertake activity in the field of climate change. At the beginning of the establishment, UNDP took part in setting up the framework. Source: <http://icctf.or.id/> (as of August 2017).

<sup>32</sup> A research funding entity established by Toray Industries Indonesia. Source: <http://www.itsf.or.id/en/> (as of August 2017)

<sup>33</sup> Applications for USAID funds for higher education research in Indonesia was accepted up to November 2016, and in 2017 five awards of up to 3,000,000USD each were announced.

- Dana Mitra Gambut Indonesia<sup>34</sup>
- Indonesia Science Fund<sup>35</sup>

Although there were no financial statement reports readily available about LIPI, LAPAN, and other cooperating implementing agencies, these are public research entities specialized in research, and at interviews they said that research budgets and disbursements were made as planned in the national budget and that they had no financial difficulties affecting the continuation of research projects or the operation and maintenance of supplied equipment.

In view of the above, there are almost no financial problems associated with the precision equipment supplied to the implementing agency or its operation and maintenance and in as much as UPR is continuing to seek funding to support its research, essentially no problem is observed.

In view of the above, no major problems have been observed in the policy background and the organizational, technical, financial aspects. Therefore, sustainability of the project effects is high.

## **4. Conclusion, Lessons Learned and Recommendations**

### 4.1 Conclusion

The purpose of the project was to promote the implementation of REDD+ in Indonesia by developing a fire detection and fire prediction system, remediation of peatlands and forest through efficient water management, and establishing effective absorptive and storage capacity for greenhouse gas, and particularly CO<sub>2</sub>.

The importance of forestry management for reduction of greenhouse gas generation and the regional importance of Kalimantan, are consistent with Indonesian development policy. Further, they have been consistent with the need for the management and remediation of peatland which has grown in recent years. In Japanese development assistance policy, importance is assigned to the field of climate change and conforms to the policy of promoting a comprehensive approach. Therefore, the relevance is high. Regarding effectiveness, as a study of assessment of carbon emission, as well as that of carbon management methods, have been specifically engaged from various perspectives, it has been partially accomplished. However, regarding the establishment of a system for appropriate management of peatland and forests, to be shared with the government of Indonesia as well as the international community, as well as building a system for prevention

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Source: <https://www.iie.org/Programs/SHERA> (as of August 2017).

<sup>34</sup> A fund recommended by BRG. Grants are made to provinces having peatlands, Riau, Jambi, South Sumatra, and Central Kalimantan for up to 24 months and the limit of 300,000,000 rupiahs. Source: <https://indonesia.wetlands.org/id/publikasi/dmg-indonesia> (as of August 2017).

<sup>35</sup> A research support fund administered by the Akademi Ilmu Pengetahuan Indonesia (AIPI); Source: <http://www.dipi.id/>



of global warming, were not achieved because the planned activities during the project period were not carried out. Regarding impact, efforts for actual application are continuing towards a functional system of MRV. Note that because no overall goal was set, this is not included in the evaluation of the project impact. Another collateral impact is the achievement of efficiency in broad-area water management by the system to measure hydrological data procured by the project. Therefore, effectiveness and impact are fair. The project was completed within the time provided and project cost exceeded the planned amount so that efficiency is fair. Sustainability is judged to be high, as the necessary policy rationale for continuation of the results of the project, its institutional arrangements, technical aspects, and financial aspects are still in effect, reflecting the need for peatland recovery in Indonesia.

In light of the above, this project is evaluated to be satisfactory.

## 4.2 Recommendations

### 4.2.1 Recommendations to the Implementing Agency

Valuable observation data has been accumulated in the course of monitoring greenhouse gas emission in peatlands by the project. In Indonesia, in view of the need for an MRV system, its potential for promoting REDD+ and its contribution related to the issues of climate change, completion of the MRV system for peatland areas, based on the outputs of this project, is an urgent matter. It is desirable that hereafter the Ministry of Environment and Forestry, that is presumed to undertake the work of validation for MRV systems, builds an implementing organization for research projects that provide a clear exit strategy for research activities while continuing to impart issues to be resolved and research elements thereof, in terms of the effective and efficient application of the system at the working level. It is thought that for the establishment of a practical MRV system, it is necessary to have a multidisciplinary platform that enables to merge social science and natural science based on the industry-government-university partnership in Indonesia. So that the Indonesian government can work toward realistic practicality and transparency, and sharing of problem awareness. For the management of a multidisciplinary platform, it is desirable to make the procedures and milestones of system establishment as clearly visible to the participating organization and its members as possible and adopt an open innovation approach that enables to appreciate each contribution in every field by all participants.

### 4.2.2 Recommendations to JICA

None.

### 4.3 Lessons Learned

#### Goal setting for SATREPS climate-change projects, with consideration given to possibility of achievement

The project purpose was to construct a model for carbon management of peatlands, and at the same time, it was intended to build a cooperative arrangement between developing countries and the international community regarding the subject of climate change. However, it became difficult to proceed research activities as planned regarding climate change measures, owing to the influence of discourse on the international framework, and the influence of a change of the administration as well as the reorganization of government ministries. Further, the research for the project included the ambitious plan of building a model for carbon emission management in peatland areas but the problem was the feasibility of carrying this plan out within only five-year project period to complete all the research needed. Particularly, it was a situation in which building a carbon volume assessment model required the collection of necessary data, its analysis, and validation that was not completed.

Within the limited project timeframe, for research results are produced as planned and for project purposes to be achieved, it is desirable that the hypothesis to be tested be clearly stated, that the necessary inputs be collected and put to use, and to make a plan of activities that includes alternatives in the event that the project does not proceed as planned. Further, regarding setting an overall goal, having reached a prior consensus among stakeholders on what should be the “utilization of research outcome”, it should be specified as a “milestone” to be reached in about three-year period after the project. It is also desirable that the users or beneficiaries of this “utilization of research outcome” must be specifically identified, then they are to be incentivized during the project. It enables the examination of prospects for the realization of the utilization of research outcome during the project. In case that a certain outcome of research has been accomplished by project completion and the approach to “utilization of research outcome” has become clear, it is desirable to engage in follow-up activity to facilitate “utilization of research outcome” including coordination with other schemes and other donors.

#### Sustainability of research funding in Indonesia

Research funds for universities in Indonesia are basically obtained from RISTEK. This system distributes funds in relatively small amounts, to individual researchers. At present, there is no system comparable to the system at Japan’s MEXT for making research grants for scientific research for large-scale projects. Therefore, in the case that the counterpart is a university research institution, the continuation of research after the end of a project is often influenced by whether or not the university has an external fund source such as an overseas donor. Therefore, if there is an exchange of memoranda or agreement between the two universities in Japan and Indonesia from the outset, it is relatively easy to ensure the post-project continuation of research. If there is

no such agreement, for the sake of sustainability of the research, it is desirable to plan the specific activities to make a joint research proposal to the international research fund of the relevant field during the project period.

Method of ex-post evaluation of a SATREPS project lacking a specified overall goal

When the project does not assign an overall goal, that is, there has not been an agreement with the counterpart regarding an overall goal of the project, information and data corresponding to a super goal of research and development, and results based on the degree of accomplishment of project purpose at the time of terminal evaluation can be adopted as the “expected impact.” However, while the related information should be described in the verification of impact on a trial basis, as long as consideration is given to the outlook for actual utilization of results after project completion, it is not to be directly judged in the evaluation. On the other hand, it is necessary to examine whether there are any collateral impacts and the contents, including those that were not anticipated before the start of the project. Those thereby should be appraised as overall effectiveness and impact. Furthermore, the continuation of research activities related to the “expected impact” should be judged in the evaluation for sustainability.

End