

Republic of the Philippines

FY2016 Ex-Post Evaluation of Technical Cooperation Project  
“The Project on Topographic Mapping for Peace and Development in Mindanao”

External Evaluator: Tokiko Ito, Octavia Japan Co., Ltd.

## 0. Summary

The topographic map at a scale of 1:50,000 of Mindanao was not updated since the printed maps<sup>1</sup> was produced in the 1950's. This project updated the information gathered by new satellite imageries and field identification and developed digital topographic maps<sup>2</sup>. For the overall goal, the project aimed for the development projects in the Mindanao area to be implemented in the future by utilizing the maps in planning the development of the region.

This project is fully consistent with the development policies and development needs of the Philippines and Japan's ODA policy, and thus, the relevance is high. By this project, new information required for production of the digital topographic maps was collected by satellite imagery and field identification. However, as a result of the verification of the data for printing, the data for GIS applications and the printed maps from the data for printing (hereafter referred to as “updated printed maps”) by National Mapping and Resource Information Authority (hereafter referred to as “NAMRIA”) after the completion of the project, NAMRIA judged that the digital topographic maps as final products have not reached the level acceptable as completed products. Moreover, although the map users, mainly Local Government Units (hereinafter referred to as “LGU”), received information on how to utilize the digital topographic maps, it cannot be judged that the knowledge and skills for utilization had been conveyed. Furthermore, regarding the recommendation for the environment of utilization of the digital topographic maps, the recognition and ownership of the implementing agency and others are low, and so, it cannot be judged that the knowledge for improvement of environment for utilization was conveyed. Thus, the project purpose has not been achieved. Regarding the overall goal, after the completion of the project, among the digital topographic maps, the data for printing was corrected and approved and all the map sheets of the updated printed maps were printed. But, the awareness among the users about the issued maps is low and the actual

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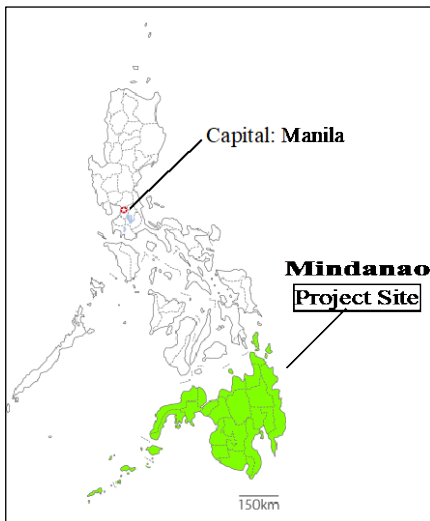
<sup>1</sup> “Printed Map” is a topographic map that is printed.

<sup>2</sup> “Digital Topographic Maps” include “Data for Printing” (PDF and TIFF) and “Data for Geographic Information System (hereinafter referred to as “GIS”) Applications” (Shapefile). Shapefile is composed of a set of plural files having roles such as graphic information and attribute information (for example, the extension is .shp, .shx, .dbf, .sbn, .sbx etc.), and consists of layers of many files with different information. (Source: <http://www.pasco.co.jp/recommend/word/word028/>: Accessed on June 1, 2017). Spatial information has various forms of expression. In this project, vector data drawing points, lines, and planes are used as the data for GIS applications. (Source: <https://www.esri.com/gis-guide/gis-datamodel/gis-datamodel/>: Accessed on June 1, 2017)

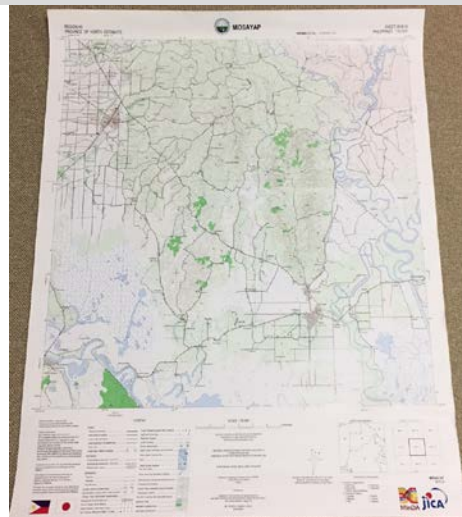
utilization is limited. The data for GIS applications has been corrected and has not been distributed except for a few cases, and so, actual utilization is very limited and it was difficult to confirm the status of utilization at some provided locations. Thus, the effectiveness and impact are low because the realization of the effect from the project implementation was not confirmed. The project cost was within the plan. Although the project period was extended based on the change of the plan, it cannot be judged that the data for GIS applications was completed at the time of completion of the project. Accordingly, the efficiency is fair. Regarding sustainability, there are no major problems in terms of the policy background and technical aspects. With respect to the organizational and financial aspects of the implementing agency and others, it cannot be judged whether or not it will be directed to promotion of the utilization as the data for GIS applications has not been utilized. Therefore, the sustainability of the project effects is fair.

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

## 1. Project Description



Project Location



Completed Updated Printed Map of the Topographic Map

### 1.1 Background

Before the project, the Government of the Republic of Philippines (hereinafter referred to as “GOP”) advocated reconstruction and development in conflict affected areas for the peace and stability of the nation in *Philippine Development Plan 2004-2010*. It was expected to efficiently formulate development plans in Mindanao, the southern region of the country, and to effectively develop projects and promote implementations based on the development plans. The topographic maps provide the basic geospatial information essential for development, but the

topographic maps of Mindanao at that time was only the old printed maps produced in the 1950s. Therefore, renewal of the topographic maps was required. The GOP requested the Government of Japan for a study on the digital topographic maps at a scale of 1:50,000. In response to this request, the Japan International Cooperation Agency (JICA) has designated NAMRIA as a counterpart organization (hereafter referred to as “C/P organization”) and Mindanao Development Agency (hereinafter referred to as "MinDA") as a relevant organization, signed the *Implementation Arrangement* (hereinafter referred to as "I/A") in January 2010, and the project was implemented from March 2010 until March 2013.<sup>3</sup>

## 1.2 Project Outline<sup>4</sup>

Overall Goal		By utilizing the digital topographic maps in the development planning of the Mindanao area, development projects in the Mindanao area will be implemented in the future.
Project Purpose		The digital topographic maps at a scale of 1:50,000 of the Mindanao area, which can be utilized for development plan of the province / region level in the Mindanao area, are updated, and stakeholders utilizing the maps recognize the methods of utilizing the topographic map.
Outputs	Output 1	Satellite Imagery at the appropriate scale covering the area shown in Attachment I of I/A shall be acquired.
	Output 2	Existing conditions relevant to the project including organization set-up, mapping system, facilities management and ground control points shall be reviewed.
	Output 3	Map production shall be undertaken using digital mapping technology in accordance with Survey Operation Manual of JICA
	Output 4	Recommendation for the wide and effective use of the topographic maps produced under the project shall be prepared.
Total Cost (Japanese Side)		1,143 million yen
Period of Cooperation		March 2010 - March 2012 (Extended Period: April 2012 - March 2013)
Implementing Agency		NAMRIA
Other Relevant Agencies / Organizations		MinDA, LGUs: Region, Province, City, Municipality, Barangay in Mindanao. <sup>5</sup> Regional Offices of National Government Agencies: Development of Environment and National Resources (hereinafter referred to as “DENR”), National Economic and Development Authority, hereinafter referred to as “NEDA”), Department of

<sup>3</sup> After signing I/A, the responsibility was handed over to MinDA from the Mindanao Economic Development Council (hereinafter referred to as “MEDCo”) in 2010.

<sup>4</sup> Based on the ex-ante evaluation sheet, I/A, and final report, summary and indicators are organized and re-set for ex-post evaluation, changes are stated in the attachment.

<sup>5</sup> Under the central government in the Philippines, there are 17 regions (Region) and there is a hierarchical structure of local administration beneath. It is a three-layer structure of (1) Province and highly urbanized city, (2) City (Constituent City) and Municipality, and (3) Barangay (Minimum administrative unit).

	Transportation and Communication, Department of Agriculture (hereinafter referred to as “DAR”) etc.
Supporting Agency/Organization in Japan	N/A
Related Projects	<p>【Technical Cooperation】</p> <ul style="list-style-type: none"> <li>- Study for Mapping Policy and Topographic Mapping for Integrated National Development Plan (February 2006 – March 2008)</li> <li>- Comprehensive Capacity Development Project for the Bangsamoro (hereinafter referred to as “CCDP”) (July 2013 – July 2019)</li> </ul>

### 1.3 Outline of the Terminal Evaluation

This project is the Technical Assistance related to ODA Loan, but because the project set a product, the digital topographic maps, as the project purpose, the terminal evaluation was not conducted.

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Tokiko Ito, Octavia Japan Co., Ltd.

### 2.2 Duration of Evaluation Study

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

Duration of Study: August 2016 – November 2017

Duration of Field Study: January 11 – 29, 2017 and April 20 – 29, 2017

### 2.3 Constraints during the Evaluation Study

As for the project summary and indicators of this project, the content of the ex-ante evaluation sheet, I/A, the final report were slightly different from each other as shown in the attached history of changes of PDM. In this ex-post evaluation, based on each of these documents, log frames and indicators were arranged and reset for evaluation. In addition, the information collected before the field survey was limited. The fact that NAMRIA did not acknowledge the digital topographic maps, final products, as completed products, was found out at the time of the survey and survey items had to be added on the spot. The product, digital topographic maps, was set as the project purpose in this project as mentioned earlier, so the evaluation of the impact and sustainability was judged with reference to the concept of

“Technical Cooperation for Development Planning”.

### 3. Results of the Evaluation (Overall Rating: D<sup>6</sup>)

#### 3.1 Relevance (Rating: ③<sup>7</sup>)

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

At the time of planning, the GOP put “peace and stability of the state: reconstruction and development in conflict-affected areas” in policy through the *Philippine Development Plan (2004-2010)*. Among them, by updating and digitizing the topographic maps of the Mindanao area, efficient formulation of the development planning for the region and effective promotion of development and implementation of development projects were expected. At the time of completion of this project, the GOP continued to promote peace and stability that supports national development through *Philippine Development Plan 2011-2016* (hereinafter referred to as “*PDP 2011-2016*”). In “*PDP 2011-2016*”, the GOP furthermore offers, a) to mainstream support system that can contribute to an objective decision-making, b) empower the local governments with new capacities that can improve their service delivery, and c) provide a means for citizens to access vital information.

In MinDA's *Mindanao 2020 Peace and Development Framework Plan* (hereinafter referred to as “*Mindanao 2020*”) on the development of Mindanao for 20 years from 2011, strengthening the capabilities of the LGUs, regional offices of national government agencies, and academic and research institutions for utilization of GIS and mapping is identified as a strategy to activate stakeholders for the regional development planning. In other words, from the start of the project to the completion, in the country, the development of the geospatial information management environment for development by the local government was promoted. From the above, this project was highly consistent with the development policy of the GOP.

##### 3.1.2 Consistency with the Development Needs of Philippines

At the time of the start of the project, the topographic map at a scale of 1:50,000 of the Mindanao area was only the printing version and was made about 60 years ago. Recent years, changes in geospatial information due to natural disasters, etc., were large, and it was urgent to formulate the land use plan, hazard map etc., in the area. The needs for the renewal of topographic map, especially the needs for the topographic data for GIS applications, were very

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<sup>6</sup> A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

<sup>7</sup> ③: High, ②: Fair, ①: Low

high. Furthermore, at the time of ex-post evaluation continuously from the time of project formulation, the officer of the Mapping and Geodesy Branch (hereinafter referred to as “MGB”) of NAMRIA, the officer of Knowledge Management Division of MinDA, and the provincial level of planning and development officer at Region XI considered the topographic map at a scale of 1:50,000 as important information for development planning (geospatial planning and project planning) and decision making for private and academic sectors in addition to governmental agencies. According to the MinDA officials, planning for a specific area requires a topographic map at a scale of 1/10,000 for the town level and development partners of Mindanao, but the topographic map of 1:50,000 scale by NAMRIA should be used as the base map information<sup>8</sup> by government agencies and LGUs according to the guidance of NEDA. Therefore, it can be said that updating the topographic map and producing the data for printing and data for GIS applications by this project were consistent with the development needs.

After the start of the project, it was agreed that the Basilan Island and the southern islands of the Autonomous Region in Muslim Mindanao (hereinafter referred to as “ARMM”), which had been excluded from the initial plan of topographic map area, were added to cover the entire Mindanao area.<sup>9</sup> This was because there were security problems due to conflict affected areas and hampered development, and as the situation had been improved somewhat before the project was implemented, as a result, the change was agreed. Also from the viewpoint of Peacebuilding Needs and Impact Assessment (hereinafter referred to as “PNA”), the change of the target site contributes to the reduction of the instability factors and is recognized as reasonable<sup>10</sup>.

### 3.1.3 Consistency with Japan’s ODA policy

At the time of ex-ante evaluation, the Ministry of Foreign Affairs’ *Country Assistance Plan for the Philippines (2008)* set three priority areas. One of which was “peace and stability of

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<sup>8</sup> Various geospatial information is being developed according to each purpose by various stakeholders such as the national government, local governments, and private business operators, etc. Although such geospatial information secures a certain degree of precision, it will cause deviation within the range of accuracy, so it is necessary to use a common position criterion when preparing geospatial information. “Base map information” refers to information that serves as a reference for position in a digital map. (Source: <http://www.gsi.go.jp/kiban/towa.html>: Accessed on July 3, 2017)

<sup>9</sup> Regions in Mindanao are as follows: Zamboanga Peninsula (Region IX), Northern Mindanao (Region X), Davao Region (Region XI), Soccsksargen (Region XII), Caraga (Region XIII) and ARMM.

<sup>10</sup> At the time of ex-post evaluation, at the interview, several departments of ARMM also expressed high expectations to the updated topographic map. According to the consultant, MinDA was concerned about dealing with the exclusion of the islands in ARMM. If the area had been excluded from the targeted area, there was a possibility that discontents could have come out from ARMM, and the official of MGB of NAMRIA also stated that as the topographic map is for peace, it was impossible to exclude some areas in Mindanao. It cannot be denied that there was a possibility that the reconciliation process could have been affected if ARMM disagreed with the treatment of areas being excluded from the topographic map targets.

Mindanao”. The priority was given to the support for the goal of withdrawing Mindanao from the poorest areas and consolidating the peace of Mindanao. In addition, based on *Support Package for Peace and Stability in Mindanao* announced in 2002 by the Ministry of Foreign Affairs, a) support for policy formulation and implementation targeted at the ARMM government, b) improvement of basic human needs, and c) peace-building were clearly stated as priority areas. JICA stated “Peace and Development of Mindanao” as a cooperation program in the *Country Assistance Strategy for the Philippine* at the time of ex-ante evaluation. This project contributes to the implementation of development projects in the Mindanao area, as the peace agreement between the GOP and the Moro Islamic Liberation Front progresses, and is judged as highly consistent with Japan’s ODA policy.

Accordingly, this project was highly relevant to the Philippines’ development plan and development needs, as well as Japan’s ODA policy. Therefore, its relevance is high.

### **3.2 Effectiveness and Impact<sup>11</sup> (Rating : ①)**

#### **3.2.1 Effectiveness**

Upon this evaluation, based on the description of the ex-ante evaluation sheet, I/A and final report, the project purpose, outputs and each indicator are re-organized as attached, effectiveness and impact are analyzed, and level of achievement is judged<sup>12</sup>.

##### **3.2.1.1 Achievement of Project Purpose**

In this project, as shown in Table 1, four outputs were set in order to achieve the project purpose, “the digital topographic maps at a scale of 1:50,000 of the Mindanao area, which can be utilized for development plan of the province / region level in the Mindanao area, is updated, and stakeholders utilizing the maps recognize the methods of utilizing the topographic maps”. At the time of completion of the project, the Output 1 and 2 on the acquisition of information required for the production of the digital topographic maps were generally achieved and it was confirmed that Output 3 on the production and the Output 4 on the utilization of the topographic maps were partially achieved.

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<sup>11</sup> The sub-rating for Effectiveness is to be considered together with Impact.

<sup>12</sup> As stated in the attachment, the ex-ante evaluation sheet has one project purpose, but at the stage of I/A attached with the final report, there are two project purposes and no indicators are stated. In addition, the Project Purpose 1 and Output 3 and Project Purpose 2 and Output 4 stated at the time of the final report are similar.

Table 1 Achievement of Output

Output	Indicator	Actual
Output 1	Gross area of acquired satellite imagery	New ALOS <sup>13</sup> satellite image data of almost the same area as target area of the topographical map (100,500km <sup>2</sup> ) changed in June 2010 was obtained.
Output 2	Number of ground control points and products	Survey data at 315 ground control points (in which 220 points was quantity of the contract) required for aerial triangulation using satellite images was acquired by December 2010. The project implementation consultant (hereafter referred to as “the Consultant”) verified that the products of each survey were sufficiently accurate.
	Number of pricking (leveling) points and products	Data of 220 pricking points required for aerial triangulation of satellite image were acquired. The Consultant verified the products according to <i>SPECIFICATION 2008</i> <sup>14</sup> and the work was completed by December 2010.
	Gross area of field identification	The field identification survey of totally about 100,500km <sup>2</sup> which was the target area of topographic map agreed with the GOP was conducted and the Consultant verified the outcome according to <i>SPECIFICATION 2008</i> etc. In addition, field completion work was conducted, but it was impossible to conduct surveys in 2% of the area due to entry restrictions for security reasons. It was agreed to supplement with secondary data and interviews.
Output 3	Orthophoto data	The orthophoto data at a scale of 1:50,000 is stored in the DVD as a final product and submitted at the time of completion of the project.

<sup>13</sup> Abbreviation for Advanced Land Observing Satellite. ALOS was one of the world’s largest land observation technology satellites at the time, launched by the Japan Aerospace Exploration Agency (JAXA) in January 2006. (Source: <http://jp.alos-pasco.com/alos/>, [http://www.sed.co.jp/sug/contents/satellite/satellite\\_alos\\_avnir2prism.html](http://www.sed.co.jp/sug/contents/satellite/satellite_alos_avnir2prism.html): Accessed on June 1, 2017)

<sup>14</sup> It was agreed that the topographic mapping work of this project conforms to the *SPECIFICATION 2008*: 1:50,000 scale topographic map specification, the symbolization specification, orthophoto creation manual, prepared in the “Study for Mapping Policy and Topographic Mapping for Integrated National Development Plan” (February 2006 - March 2008). Similarly, “Overseas Survey and Mapping (Basic Maps)” designated by JICA in 2006 and the operation manual of 2007 by JICA have been used. For orthophotography, in aerial photography, distortion occurs as it covers from high buildings and mountainous areas, and from the center of the picture to the outer periphery. In such a state, it cannot measure nor overlap with the actual map. Therefore, correcting this distortion is called orthorectification, and the aerial photograph applied with this correction is called orthorectified image (orthophoto). (Source: <http://www.pasco.co.jp/recommend/word/word058/>: Accessed on June 1, 2017)



	Produced topographic maps	By the time of completion of the project, NAMRIA confirmed and signed the contents for the draft of the updated printed maps as a C/P organization before delivery. NAMRIA received data for printing and data for GIS applications from JICA which JICA regarded as final products. But NAMRIA had not completed to check the contents by this time. As a result of the verification after that, there were map sheets of which data for printing and for GIS applications were not with satisfactory accuracy for NAMRIA and have not been approved by NAMRIA as completed products. Thus, the digital topographic maps were produced but it cannot be said that they were completed.
Output 4	Contents of realistic recommendation for implementation and method of recommendation	In order to utilize the topographic maps, the study on topographic map utilization to members of Technical Coordinating Committee (hereinafter referred to as “TCC”) <sup>15</sup> was conducted, and based on the results, recommendations for utilization were summarized. It was reported through the Technology Transfer Seminar and the Final Report. However, the implementing agency and others do not recognize the positioning of the contents of the final report to be so important.

Table 2 shows the achievement of the project purpose at the time of project completion.

Table 2 Achievement of Project Purpose

Project Purpose	Indicator	Actual
“The digital topographic maps at a scale of 1:50,000 of the Mindanao area, which can be utilized for development plan of the	The topographic maps are composed with the information by field identification according to the survey standard and updated information based on the latest images.	Information from field identification in accordance with JICA “ <i>Kaigai sokuryo sagyo kitei (Heisei 24 nen)</i> (Overseas Field Identification Operation Regulations (2012 Edition))” and the specification for the Philippines <i>SPECIFICATION 2008</i> was collected, new ALOS satellite images of the target area and existing archive data of ALOS and SPOT satellite images were acquired, and the topographic maps were produced. The digital topographic maps (data for printing and data for GIS applications) were officially received at the time of project

<sup>15</sup> TCC is composed of LGU representatives in the target area. The consultant decided the members. TCC members cooperated with field identification and the topographic map utilization study, participated in the technology transfer seminar, and conducted verification of the topographic maps, etc. The actual members were not confirmed at the ex-post evaluation because the implementing agency and others have kept no record.

<p>province / region level in the Mindanao area, are updated, and stakeholders utilizing the map recognize the methods of utilizing the topographic maps.”</p>		<p>completion. However, by the verification after the completion of the project, problems such as inconsistencies of the terrain were confirmed. This is considered to be a problem of quality control (accuracy) other than the work process described in the specification. It is judged that the digital topographic maps (data for printing and data for GIS applications) updated with the latest information cannot be said to be completed at the time of project completion.</p>
	<p>The necessary knowledge and skills for updating and utilizing the topographic maps are conveyed to the stakeholders</p>	<p>Through the technology transfer seminar and the final report, the recommendations mainly about the use of digital topographic maps and arrangement of conditions such as required technical and organizational aspects: GIS related software and knowledgeable personnel, were explained to NAMRIA, MinDA and LGUs etc., the users of the maps. Both NAMRIA and MinDA recognize that the contents of the seminar were comprehensive and there were points in the recommendations that can be agreed by the implementing agency and the related agency, but the contents of the recommendations of the report were made mainly by the Consultant and participation of the Philippine side was limited. MinDA also considers that there is no signature of the Philippine government in the final report and the report is not officially positioned. For these reasons, the implementing agency and others are not well aware of the contents of the recommendations except for the strengthening of the utilization capacity of users, which has been the identified issue by themselves since the beginning of the project.</p>

Regarding the Indicator 1 of the project purpose, “The topographic map is composed with the information by field identification according to survey standard and updated information based on the latest images”, the digital topographic maps (data for printing and data for GIS applications) were submitted to NAMRIA at the completion of the project. The ALOS satellite image data of almost the same area as the project target area (100, 500km<sup>2</sup>) was acquired by the Consultant during the project implementation. As the amount of the clouds photographed in the images exceeded the standard for 20% of the area, archive data of existing ALOS and SPOT<sup>16</sup>

<sup>16</sup> Abbreviation for Satellite Pour l'Observation de la Terre. SPOT is the earth observation satellite of the National Space Research Center of France developed in 1986. From the time of the start and during the implementation of the project, SPOT 1 to 5 were developed. (Source: [http://www.sed.co.jp/sug/contents/satellite/satellite\\_spot.html](http://www.sed.co.jp/sug/contents/satellite/satellite_spot.html),

satellite images was adopted after consultation between the Consultant and JICA (Output 1). The field identification study was conducted according to *Gomanbun no ichi chikeizu zushiki (Heisei gannen ban)*(*Diagram of Topographic Map at a Scale of 1:50,000 (Heisei 1 version)*) by Geographical Survey Institute, the Ministry of Construction of Japan, *Overseas Field Identification Operation Regulations (2012 Edition)* by JICA, and *SPECIFICATION 2008*, the specification of the Philippine, in Central Mindanao, Northern Mindanao, and South Mindanao by three subcontractors in the Philippines. Regarding the contents, the number of designated ground control points, the number of pricking (leveling) points and the actually implemented area of this field survey (field identification and field completion), NAMRIA acknowledged that it was a comprehensive study of information for both contents and volume required for the digital topographic map production at the time of ex-post evaluation (Output 2). However, it was judged that there was a problem in accuracy of the some of the map sheets of the digital topographic maps (data for printing and data for GIS applications) which were produced from those information and confirmed and submitted to NAMRIA as final products by JICA at the time of completion of the project as a result of verification by NAMRIA afterwards (Output 3). After the completion of the project, upon request from NAMRIA to JICA, the digital topographical maps (data for printing and data for GIS applications) were corrected by the Consultant. By the time of ex-post evaluation, the updated data for printing was approved by NAMRIA, in June 2014. However, NAMRIA considers that there was still a problem with accuracy in data for GIS applications and continues the correction work on its own. By the time of ex-post evaluation, the correction of 52 map sheets out of all 227 map sheets of the Mindanao area was completed. It was said that it would take several more years to complete all.

In relation to the Indicator 1 of the project purpose, regarding Output 3, “Map production shall be undertaken using digital mapping technology in accordance with Survey Operation Manual of JICA”, judged to be partially achieved, because final verification was carried out by NAMRIA and LGUs mainly based on the print charts from just before the project completion, November 2012, until after the completion of the project, November 2013. As a result, inconsistencies such as mismatches of name of locations, position of roads and bridges and points of interest, etc., were found among the orthophoto data, the data for printing and the data for GIS applications in some of the map sheets and NAMRIA did not approve the maps. It was also confirmed that some of the map sheets were produced seemingly based on the old information and not on the latest information. In NAMRIA, it is required for its projects to be

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<http://www.intelligence-airbusds.com/en/143-spot-satellite-imagery>: Accessed on June 1, 2017)

approved by the Administrator who is the chief executive officer. With regard to the topographical maps, the manager of the department, the Director of MGB, approves. At the time of ex-post evaluation, NAMRIA still could not determine that the data for GIS applications was completed although there was pressure from government agencies etc. Based on this circumstance, it cannot be said that a part of map sheets of the digital topographic maps (data for printing and data for GIS applications) were made up of utilizable updated information at the time of completion of the project. From the above, it is judged that the Indicator 1 of the project purpose was not achieved by the time of completion of this project.

The verification of the topographic maps was carried out step by step even before the final verification. The Consultant conducted a confirmation of legends and things to be deleted, etc. in accordance with the specification agreed with NAMRIA before the compilation work that was performed in Japan. In the middle of drafting work, verification by the TCC was carried out, and at the final stage, from December 2012 to February 2013, the opportunities of verification by NAMRIA staff in Japan were set up. At the stage of final draft, all pages of the printed maps of the topographic maps were signed by NAMRIA for the confirmation of receipt. However, according to the Director of MGB, NAMRIA, the area of verification by the TCC consisting of only some representatives was limited and the time for verification by NAMRIA was insufficient, but inconsistencies were pointed out. Inconsistencies of the data were more widely confirmed by NAMRIA even after the completion of the project. In the Director's opinion, it was possible for NAMRIA staff to quickly make verifications and corrections from time to time if the compilation work was carried out in the Philippines. Furthermore, NAMRIA assumed that the Consultant would continue to respond to the correction even after the completion of the project and, before the final products were submitted, signed the draft of updated printed maps for confirmation of contents and receipt as a formality. This perception of NAMRIA is an understanding based on verbal communication with the Consultant, and there is no agreement by written document. There has been a business relationship between the local affiliate of the company of the Consultant and NAMRIA, although the affiliate was not involved in this project. So, it is possible that the relationship affected NAMRIA to think that it might be possible to keep correspondence even after the completion of the project and affected NAMRIA's perception of the completion of the project. According to the official of MGB, NAMRIA, NAMRIA had actually contacted the local affiliate for the correction work of data for GIS applications since 2014.

According to the Consultant, there are usually errors such as inconsistency of the name of

place or the position of the specific target when the topographic maps are produced. When they responded to a request based on the evaluation report of the verification result by NAMRIA, in November 2013, they have corrected the points that they judged necessary. To that effect, according to the Consultant, they explained to NAMRIA and agreed upon the actions that were taken, in February 2014, but there is no agreement by written document. On the other hand, according to NAMRIA's Deputy Director of MGB and the section manager for verification, etc., there were still points to be corrected by the Consultant, and there was no remark that they had agreed not to request additional amendment. In this way, there are differences in opinions between NAMRIA and the Consultant concerning the verification process and the accuracy of the final product.

Next, regarding the Indicator 2 of the project purpose, “the necessary knowledge and skills for updating and utilizing the topographic maps are conveyed to the stakeholders”, according to NAMRIA and the Consultant, NAMRIA has skills to update topographic maps. By a self-evaluation, MinDA has improved the knowledge of geospatial data management and understood the needs for cooperation with stakeholders and for improvement of the environment for coordination needs through this project.

In relation to promotion of utilization, a study on map utilization to grasp the knowledge, environment and the needs for utilization of the digital photographic maps of the concerned users was implemented in this project. By the technology transfer seminar and the final report, the techniques required, the use and the improvement of environment for utilization of the topographic maps were recommended to the users of NAMRIA, MinDA and LGUs<sup>17</sup> (Output 4). Although the data for GIS applications with accuracy that NAMRIA can approve was not completed by the time of the ex-post evaluation, at the user interview<sup>18</sup> for ARMM and the planning development personnel of provinces and cities in Region XI, it was confirmed that they recognized the use of the topographic maps and the needs to utilize the data of GIS

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<sup>17</sup> The main recommendations of the final report are as follows: 1) Basic information: base map, theme map, scale, GIS, explanation of GIS analysis; 2) Direction for using topographic maps in Mindanao: management based on the project cycle management, planning of a framework plan by cooperating between sectors and administrative levels, improvement of the ability of regions and provincial officials to utilize maps and GIS and thematic maps to be updated/produced at each local administrative level, MinDA's coordination ability required for updating GIS data, thematic maps to be updated in ARMM, utilization and improvement of NAMRIA's GeoPortal site.

<sup>18</sup> The user interviews were implemented to those as below; Regional offices of national government agencies of Region XI: DAR, DENR and Mines and Geosciences Bureau; Planning and development office of 5 Provinces: Davao del Norte, Davao del Sur, Davao Oriental, Davao Occidental and Compostela Valley, and 2 cities: Davao and Tagum; ARMM: DAR, DENR, Department of Agriculture and Fisheries, Department of Interior and Local Government, Department of Tourism, Department of Public Works and Highways, Technical Management Services-Office of the ARMM Regional Governor; Planning and development office of ARMM and Cotabato city; Davao Integrated Development Program supporting LGUs; 1 banana export and plantation company in Davao city; and 1 conflict monitoring NGO in Davao city. Moreover, information other than Region XI was interviewed to the officials of Four Area Management Offices (East, West, South and North) of MinDA.

applications was high. The seminar seems to have played the role of PR of the digital topographic maps. But it is possible that the recognition of the data for GIS applications spread wider due to the government policies and dissemination of free GIS software from the time of project completion to the ex-post evaluation. On the other hand, at the time of ex-post evaluation, according to the implementing agency and others, it was said that additional practical training was necessary for the users such as LGUs to acquire knowledge and skills for production of thematic maps. Even at the interview with the map users, it is also apparent that the environment of acquiring techniques, GIS related software and human resources, has not necessarily been improved. One of the reasons for this may be because there is no data for GIS applications for utilization.

With regard to the Indicator 2 of the project purpose, the Output 4, “Recommendation for the wide and effective use of the topographic maps produced under the project shall be prepared”, which is partly achieved, NAMRIA and the Consultant became lecturers, and the technology transfer seminars were held in two places for half a day each in November 2012. Participants were each 197 and 171 people from the regional office of national government agencies, LGUs from regions, provinces, cities, municipalities and Barangay, NGOs and others of all the regions in Mindanao. In the half-day program, the contents of the project, the study results, digital topographical maps, operation method of GIS software, the uses of thematic map<sup>19</sup> etc. were introduced. In addition, a CD of PowerPoint documents and videos etc. used in the seminar were distributed to the seminar participants. According to officials of MGB, NAMRIA and MinDA, the contents of the seminar was comprehensive to a certain extent and appropriate, but the time duration was short and the session was only by a lecture style and there was no session of an on-site training. Compared with the software operation, the time for the use of data for GIS application, production of thematic maps etc., was limited. Thus, there was a difference in the degree of comprehension depending on participants. The implementing agency and others acknowledged the lack of the user's ability of techniques to utilize the digital topographic maps and initially requested the capacity building within the project, but it was not implemented. In addition, the license of the introduced GIS software, ArcGIS, was expensive

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<sup>19</sup> The thematic map is “a map drawn with emphasis on a specific subject”. On the map, there are “a map representing specific theme on a general map such as a topographic map as a base map and a map produced by field identification survey for a certain purpose from the beginning”, and “representative of the former one are geological maps and land classification diagrams and the latter are cadastral maps and navigation charts, etc.”. “There are various kinds of thematic maps such as urban planning charts, disaster prevention diagrams, various statistical maps, etc.” “Urban maps and road maps”, “cultural property distribution map” and “evacuation center map” are kind of thematic maps. (Source: [https://navi.ndl.go.jp/research\\_guide/entry/theme-honbun-601004.php](https://navi.ndl.go.jp/research_guide/entry/theme-honbun-601004.php): Accessed on June 1, 2017)

although it was the standard GIS software and there was no other software with the same functions at that time. During the interview at the ex-post evaluation, it was also heard that it was not yet realistic for many LGUs to obtain the software although the necessity of improving the environment for GIS utilization was recommended. Even at the time of ex-post evaluation, the conditions for the digital topographic map utilization: GIS related software, techniques and human resources, were not necessarily arranged.

It is said that the implementing agency and others were not involved in the creation of the recommendations subjectively, and the contents of the seminar and the recommendation of the final report were created and presented by the Consultant. At the time of ex-post evaluation, MinDA officials said that the contents of the recommendations of the final report were checked and generally agreed. However, there was no high motivation to implement and coordinate as recommended in the report as it is understood that the report was not the one approved by the GOP officially. The Director of MGB, NAMRIA has no particular opinion on the contents. After the completion of the project, there was a low recognition for the position of the recommendations by the implementing agency and others responsible for promoting and coordinating the utilization.

In this project, the purpose of the Technology Transfer Seminar was thought to be to disseminate the digital topographical maps to the stakeholders, the main users, and it is considered that the final report was for the implementing agency and others. The prepared Technology Transfer Seminars and the contents of the recommendations were comprehensive and useful referring to the techniques and system arrangement for utilizing the digital topographic maps towards NAMRIA, MinDA and the users. It is important that the digital topographic maps are actually utilized after they are issued. However, the perception and ownership of the implementing agency and others are low regarding the contents of the recommendations about the utilization environment for the digital topographic maps which were thought to be necessary for promoting those utilization. From the above, it is difficult to judge that consideration for feasibility about the recommended contents and the methods for having common opinions with and getting recognition of recommendation from the implementing agency and others were appropriate. Thus, the indicator of the output 4 is considered to be partially achieved. It cannot be judged that the knowledge and technique for utilization had been conveyed to the stakeholders. Therefore, it is judged that achievement of the Indicator 2 of project purpose is fair.

As described above, the project did not satisfactorily achieve its project purpose because

the digital topographic maps, the data for printing and the data for GIS applications, with accuracy that NAMRIA could approve were not completed at the time of completion of the project and because it cannot be judged that the stakeholders who were to utilize the maps were conveyed with the knowledge and technique for utilization although they received information on the use of the maps.

### 3.2.2 Impact

#### 3.2.2.1 Achievement of Overall Goal

Regarding the overall goal, “by utilizing the digital topographic maps in the development planning of the Mindanao area, development projects in the Mindanao area will be implemented in the future”, between the project completion and the ex-post evaluation, the data for printing has been completed. NAMRIA is on the process of correcting the data for GIS applications at the time of ex-post evaluation. By March 2016, NAMRIA printed out all the map sheets of the data for printing and the map sales offices of NAMRIA in DENR of all regions sell them. According to the sales officer of Region XI in Davao City, mainly private enterprises have purchased the printed maps. The topographic maps are available free of charge for the government agencies through an application to NAMRIA. It is not free for private enterprises and organizations etc. Distribution of data for printing (PDF) is started on a request basis.<sup>20</sup> It is said that a part of the map sheets can also be referenced in the GeoPortal on NAMRIA’s website<sup>21</sup>. Because the data for GIS applications did not satisfy the accuracy which NAMRIA can accept, it has not been distributed in general. There were some cases that NAMRIA has confirmed the usages and provided the data for GIS applications in exchange for payment or free of charge after notifying that the data was still being corrected.<sup>22</sup> According to the JICA Philippine office, which holds the intellectual property rights of the digital topographic maps of this project together with NAMRIA based on the agreement in I/A, the data for GIS applications is shared to CCDP of JICA and is utilized.<sup>23</sup>

Both NAMRIA and MinDA have not carried out public relations activities on the updated printed maps map yet. At the time of ex-post evaluation, according to MinDA officials, the usage of printed maps are a material for presentation, an attachment of materials and a reference

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<sup>20</sup> NAMRIA has distributed the data for printing to the Philippine National Police, Philippine Institute of Volcanology and Seismology, LGUs, etc. The utilization purposes could not be confirmed through the ex-post evaluation.

<sup>21</sup> The data for printing posted on the GeoPortal can be browsed but cannot be downloaded.

<sup>22</sup> It is used for humanitarian assistance and disaster response. It is utilized for JICA “Davao City Infrastructure Development Plan and Capacity Building Project” (January 2017 – implemented at present).

<sup>23</sup> The purpose of utilization could not be confirmed through ex-post evaluation.



for planning. However, in the user interview mainly for regional offices of national government agencies and LGUs, the completion of the updated printed maps, the sale at the NAMRIA map sales office, free of charge provision to government agencies, and the location of the sales office were unknown. Cases of utilization of updated printed maps were not confirmed. In January 2017 during the field survey of the ex-post evaluation, at the Mines and Geosciences Bureau of Region XI, the updated printed maps attached to the application for permission of the mining investment plan of one company submitted in the same month was observed. At the bureau, usually a printed map is attached to the application form in order to indicate the investment location. Until then, they had only seen the old version of the printed maps, and it was the only case that the updated printed maps were attached. With regard to this case, it was not possible to confirm whether the user utilized it because it was an updated printed map or not. According to the NAMRIA's map sales officer in Region XI, there was an impression that the purchasers often purchased the updated printed maps upon introduction by the officers rather than those seeking them. Since the sales volume of the old version of printed maps before updating could not be compared with, it has not been confirmed whether or not the sales amount and utilization have increased after the update. According to the MinDA official, MinDA would carry out PR and distribution when all the digital topographic maps were completed. Some LGUs, NGOs and companies, etc. which have participated in the technology transfer seminar and answered the interview possess the skills to utilize the data for GIS applications and have been awaiting issuance of the data with large expectation. There are inquiries about purchasing the digital topographic maps to NAMRIA and MinDA from LGUs, companies and other donors.<sup>24</sup>

Although high expectations on the digital topographic maps from LGUs, NGOs and private enterprises were acknowledged, the data for GIS applications accompanied by the accuracy that NAMRIA can approve and distribute is incomplete. The utilizations of data for printing and the updated printed maps have been started. However, in the Mindanao area, at the interviews with the planning and development personnel of the region, province and city level in Region XI including relatively developed Davao City in Mindanao area and ARMM, there were not any information of seeing or obtaining the topographic maps. It was said that the use of the printed maps was limited. These stakeholders are also subjects of the technology transfer seminar as the users of the digital topographic maps. From this, it is considered that the current awareness of the completed updated printed maps and the data for printing within the Mindanao area is still low. It is considered that it is hardly utilized for creating theme maps utilizable for

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<sup>24</sup> Under such circumstances, there was a LGU which inevitably processed data that seemed to be the PDF data for printing that was distributed at the seminar, and used it as project planning materials.

planning. From the above, the utilization of the digital topographic maps is limited, and it cannot be said that the overall goal has been achieved.

Table 3 Achievement of Overall Goal

Overall Goal	Indicator	Actual
<p>By utilizing the digital topographic maps in the development planning of the Mindanao area, development projects in the Mindanao area will be implemented in the future.</p>	<p>Actual utilization record of digital topographic maps: name of project, name of plan and use, recognition and referenced situation.</p>	<p>Although the data for printing is completed, the utilization record is limited as the data for GIS applications is incomplete, and distribution of the digitized materials is limited. The draft version of data for GIS applications is used for humanitarian relief and disaster response. For the updated printed maps, 300 copies of 227 map sheets each were printed. The sales started after July 2015 and by the end of February 2017, total 1,139 sheets of 420 map sheets in total were sold at map sales offices in DENR in the nation. At the sales office of Region XI in Davao city, main purchases were by companies. Although the above is the sales performance, the purposes of usage or the degree of utilization cannot be confirmed, and the basis for differentiating the degree of utilization as the updated version compared with the old version cannot be confirmed. Among LGUs which are the assumed topographic map users, it is assumed that there are many LGUs that are not informed of the issuance of updated printed maps within those interviewed during ex-post evaluation study, and their expectation for “digital” topographic maps is high for development planning. So, it is considered that the utilization example is limited. Therefore, it cannot be judged that the impact of this project was explicitly demonstrated from the confirmed cases of utilization of the updated printed maps.</p>

At the time of ex-post evaluation, NAMRIA continues the correction work to solve the problems of the accuracy of the data for GIS applications which were found after the project completion. NAMRIA has not approved the data as completed products. The awareness of the stakeholders of the regional offices of national government agencies and LGUs about the data for printing and updated printed maps was low, and their utilization records could not be confirmed. Although map purchases of the updated printed maps by the companies were confirmed, the reasons for utilization unique to the updated printed maps or the cases of purposes of usage were not confirmed. Thus, the effectiveness of this project implementation is

limited compared to the plan. Therefore, effectiveness and impact of the project are low.

### 3.3 Efficiency (Rating: ②)

#### 3.3.1 Inputs

Table 4 shows the plan and actual results of inputs.

Table 4 The Plan and Actual Results of Inputs

<b>Inputs</b>	<b>Plan</b>	<b>Actual (Project Completion)</b>
(1) Experts	Long-Term : Not listed Short-Term : Not listed Local consultant : Employed	Short-Term: 7 pax (Team Leader/ Field Identification/ Field Completion, Map Utilization, Control Point Survey 1 & 2, Field Identification/ Field Completion 1 & 2, Project Coordination/Field Identification, Field Completion) Local consultant: 3 companies, numbers of people unknown (Control points, pricking (leveling), Field survey and Field completion)
(2) Trainees received	Not listed	The Consultant's own expense
(3) Equipment	Mapping work in Japan	Equipment for mapping work in Japan: 4 million yen
(4) (others)	Not listed	0.6 million yen (the local cost)
Japanese Side Total Project Cost	Total 1,300 million yen	Total 1,143 million yen
Philippines Side Operational Expenses	Total cost: Not listed 1. Counterpart Allocation: Not listed Counterpart personnel expenses: Not listed 2. Equipment purchase: Not listed 3. Facilities: Not listed 4. Local cost: A part of training and development cost and implementation cost, utilities etc.	Total cost: Unknown 1. Counterpart Allocation: NAMRIA and MinDA (Counterpart), 50 pax and above: TCC members from regional offices of national government agencies, provincial planning and development department, City planning and development office, ARMM, and Bangsamoro Development Agency Counterpart personnel expenses: Unknown <sup>25</sup> 2. Equipment purchase: None 3. Facilities: Office for experts (1 room each in NAMRIA and MinDA) 4. Local cost: Travel and

<sup>25</sup> Although NAMRIA and MinDA could answer some expenses, the total amount was unable to answer.

		transportation of staff (NAMRIA: About 0.8million PHP <sup>26</sup> , MinDA: About 0.3million PHP, meetings, a part of training cost and implementation cost, utilities, internet. (NAMRIA: Amount unknown, MinDA: about 0.5 million PHP)
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Source : JICA, NAMRIA and MinDA

### 3.3.1.1 Project Cost

The target area of the topographic maps and the project period were changed (see “3.3.1.2 Project Period” below). The actual project cost was 1,143 million yen against the planned amount of 1,300 million yen and was within the planned amount, 88% of the planned amount. Not all the information on the input amount could be obtained from the Philippines side. By the time of ex-post evaluation, the Consultant additionally carried out a correction work with its own expenses. NAMRIA also continues correction work with their own expenses, mainly personnel expenses. The cost to complete the digital topographic maps is expected to increase in the future. Since the increased amount is unknown, it is not considered in the judgment of the efficiency.

### 3.3.1.2 Project Period

The planned period took 25 months from March 2010 to March 2012, and the actual project period took 37 months from March 2010 to March 2013. That was longer than planned (148% of the planned duration). This is due to the extension of the project period by 12 months attributed to the completion of the field identification during the project implementation. Because the target area includes a conflict affected area and the presidential election was scheduled in 2011, due to security concern, there was a period during which entry for the field identification was not possible. According to the Director of MGB, NAMRIA and the MinDA official, it was thought that the influence of deterioration of security could be mitigated by dialogue with the concerned people, but in fact, it was affected. The implementing agency and others also agreed to change the project period. The entry restrictions caused by security problems are difficult to forecast in advance, and it is recognized that the circumstances of the extension of the project period were reasonable.

<sup>26</sup> At the time of the final report. 1 Philippine peso (PHP)= 2.244 yen. Exchange rate as of February 2013.

The digital topographic maps, data for printing and the data for GIS applications, submitted at the time of completion of the project was not approved because the data was not with satisfactory accuracy for NAMRIA. The data for printing was completed 15 months after the completion of the project, June 2014, after correction work by the Consultant. However, even by the time of the ex-post evaluation, 46 months after the project completion, it cannot be judged that the data for GIS applications was completed and that the project was completed within the project period.

### 3.3.2 Outputs

In relation to the outputs, during the project implementation, the target area and the specification of the topographic maps were changed as follows. Firstly, based on the request of the GOP, the target area of the digital topographic maps at a scale of 1:50,000 was changed to include the Basilan Island and the southern island areas and the total became area of 100,500km<sup>2</sup> at the discussion for the Inception Report in June 2010. In the initial plan by JICA, it was figured out that it would be difficult to enter the Basilan Island and the southern island areas from the security point of view. However, the security improved somewhat by the start of the project and it became possible to enter by requesting cooperation to the relevant LGUs from the implementing agency and others. Eventually in fact, the project could not obtain entry permission from LGUs in about 2% of the target area for the field completion work. JICA and the Consultant agreed in December 2011 to prepare the topographic maps with the secondary data in addition to the data collected during the field identification and field completion conducted by August 2012. Regarding the missing information, it was planned that NAMRIA also conduct additional survey and collect information including information from LGUs for the topographic maps as much as possible.

Furthermore, as a result of the request from the GOP, in February 2011, and consultation and examination of technical specifications with the Consultant, it was agreed to include 58,000km<sup>2</sup> of Bathymetric data to the target area of the topographic map in October 2011. According to NAMRIA, the Bathymetric data was included in the old version of the topographic maps produced in the 1950s. It should not be excluded in the updated version. Changes in the project target area are fully considered based on the provision of NAMRIA's existing Bathymetric data and secondary data, the coordination and consultation for entry permission to the ARMM area, and the implementation ability based on the experience of the Consultant. It is judged that the change was necessary to achieve the outputs. It was more

desirable to discuss whether the Bathymetric data should be included in the updated topographic maps at the time of the initial planning, but it is recognized that circumstances of the change were reasonable.

According to the official of MGB of NAMRIA, NAMRIA will not place all area boundaries on the topographic maps, because the boundary issue can cause political conflicts among LGUs, from province to Barangay level. It was decided to place the boundary as the marginal information<sup>27</sup> of the map. From the view point of PNA, in the Mindanao area which in particular include the conflict affected areas, it is considered that appropriate consideration was taken so as not to create new instability factors. It is recognized that the circumstances of the changes and correspondence in this project were relevant.

From the above, the project cost was within the plan at the time of project completion. Although the project continues to incur the cost after completion of the project due to the correction work of the digital topographic maps, the amount is unknown and is not considered for evaluation judgment. The plan of project period was extended by the change of plan during the project implementation and exceeded the originally planned period. The circumstances of the changes of the plan were reasonable, but it is not judged that the correction work of the data for GIS applications has been completed at the time of ex-post evaluation. Therefore, the efficiency of this project is fair.

### **3.4 Sustainability (Rating: ②)**

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

Even during the ex-post evaluation, the GOP prioritizes the regional development through the *PDP 2011 - 2016* and *Mindanao 2020* to realize peace and security in the Mindanao area. The GOP promotes the development planning utilizing topographical maps by strengthening the capacity of LGUs and transfer of authority to LGUs, and by authorizing the use of geospatial information to LGUs, regional offices of national government agencies, and academic research institutes. The digitization of the topographic maps in the Mindanao area in this project is in accordance with the development objectives of the *E-Government Master Plan 2.0 (2016-2022)*, which aims at utilizing information and communication technology to expand the access to government information and efficient supply of government services to public, to improve the government's decision-making and to strengthen international competitiveness. At the time of

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<sup>27</sup> Description of map and map symbols: the name of diagram, scale, legend etc. stated in the outline of the map sheet.

ex-post evaluation, sustainability in policy and institutional aspects was confirmed. Due to policies for the utilization of GIS data and map information for the development planning and high demands from actual operation, sustainability of policy is high.

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

About the organizational aspects of NAMRIA, MGB is in charge of the production of topographic maps also at the time of ex-post evaluation. There are 10 staff members who have sufficient knowledge of topographical map updating. Almost enough number of staff is allocated to the work contents. It was confirmed that between the director and the staff in charge, information exchange regarding the approval process of the digital topographic maps was appropriately conducted in the department. The regional offices of national government agencies and the LGUs recognize that the topographic maps approved by NAMRIA are the base map information to be utilized for public plans. Established in 2010, MinDA has taken over the project from MEDCo, the relevant agency at the time of the initial plan. The Knowledge Management Division of MinDA is still in charge of the topographic map utilization and coordination in the Mindanao area at the time of ex-post evaluation.

Regarding the collaboration between the implementing agency and others, as the data for GIS applications was incomplete, distribution and dissemination matters were not coordinated at the time of ex-post evaluation between NAMRIA and MinDA. However, regarding technical part of the capacity development aspect in particular, MinDA planned a small-scale capacity development project for the thematic maps development for LGUs under the government budget in 2017 and coordinated with NAMRIA dispatching trainers for the training. It was confirmed through the interview that MinDA has an intention to engage in the distribution of the topographic maps that is normally done by NAMRIA when the data for GIS applications was completed. From the above, there are some issues to be addressed in the future, but sustainability in terms of organizational aspects for sustainable realization of the effect is expected.

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

At the time of ex-post evaluation, NAMRIA has sufficient knowledge of updating the topographic maps since the time the project was being implemented, as seen in the work of verifying and correcting the digital topographic maps of this project. In addition, the manual from *Study for Mapping Policy and Topographic Mapping for Integrated National Development*

*Plan* is utilized especially in the creation of small- and medium-scale topographic maps. Although there is no standard staff training internally on the technical side, NAMRIA has secured skills within the organization by dispatching staff to trainings to improve skills and to studying abroad at the higher education to acquire the latest techniques. At the time of ex-post evaluation, since the data for GIS applications with the accuracy NAMRIA can approve was not completed, it was not possible to confirm whether the produced topographical maps were actually updated at appropriate number of times and frequency and whether the NAMRIA's update plan of the maps of Mindanao area was prepared or not. However, NAMRIA is carrying out updating the topographic maps of other parts of the Philippines according to the plan, and NAMRIA's technical sustainability is considered to be secured.

On the other hand, as mentioned above, MinDA understands the importance of geospatial data management in the development planning, understands the necessity of cooperation and coordination to improve the environment to answer the needs of stakeholders, and coordinates to plan the training as required. The officials from four area management offices in Mindanao: East, West, North, and South, have been involved from the time of this project implementation and have shared information on the digital topographic maps. The officers are willing to coordinate in the area in charge. In order to promote the use of the digital topographic maps, it is necessary for the topographic map users to have the ability to utilize GIS software. There are some LGUs which present skills are considered to be low. Also, it was required to raise the capacity of GIS utilization of LGUs below the provincial level according to the results of survey of map utilization by the Consultant. In some LGUs, the participants of the technology transfer seminar have resigned, information gained at the seminar has not been handed over and related allocation of personnel and improvement of skills were not done. As discussed above, MinDA planned a skill training project for the thematic map development, it is thought that MinDA's coordination ability for promoting the utilization of the topographic map will be continued.

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

Table 5 shows the total budget of MGB, NAMRIA. The total amount increased from the time of project completion, financial year 2013, to the time of ex-post evaluation, financial year 2017, approximately by 90%: Personnel expenses increased by 45%, Maintenance and management expenses increased by 111%, and Capital and equipment etc. decreased by 35%. According to the officials of MGB, NAMRIA, the large increase of the budget is due to the increase in demand for production of hazard maps for the government disaster prevention



measures, etc. Meanwhile, the cost of printing the updated version of print topographic map and the cost of correcting the topographic map data for GIS applications were covered by the NAMRIA budget. Based on the fact that disaster management policy for creating hazard maps continues according to the *PDP 2011 - 2016*, the budget is expected to be secured in the future.

Table 5 Changes in the budget of MGB, NAMRIA

(Unit: Thousands PHP)

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017
Personnel	N/A	30,763	32,981	34,505	33,255	29,645	42,577	42,226	48,293
Maintenance and Management	N/A	300,316	249,212	195,427	261,317	205,617	536,914	584,089	552,185
Capital / Equipment	N/A	16,895	6,869	45,475	31,300	62,143	26,375	N/A	20,375
Total	353,094	347,974	289,062	275,407	325,872	297,405	605,866	626,315	620,853

Source: NAMRIA document

Note: N/A: Not Available. Detailed record of 2009 was not obtained

Table 6 shows the total budget of MinDA. The total amount increased from the time of project completion, Financial year 2013, to the time of ex-post evaluation, Financial year 2017, by 77%. It is said that since the establishment of MinDA in 2010, the total budget has been increasing year by year. Apart from this amount, MinDA has successfully acquired 2.8 million PHP from the national government budget for the capacity development training of LGUs for the utilization of topographic maps for the first time in Financial Year 2017, but it does not mean that the same scale of the budget for utilization promotion of the topographic maps in the future is secured.

Table 6 Changes in the budget of MinDA

(Unit: Thousands PHP)

	2010	2011	2012	2013	2014	2015	2016	2017
Total	51,672	56,164	60,016	84,716	101,951	103,328	117,201	149,931

Source: MinDA document

Although the prospects for the future budget is uncertain for both agencies, the development in Mindanao area is expected to be a priority issue also from now on and the

necessity of the topographic maps is high. Thus, it is conceivable that the possibility of deteriorating the financial situation is low.

From the above, no major problems have been observed in policy and technical aspects of implementing agency and others of this project. But, regarding the organizational aspects, the remaining matter is the coordination for distribution and dissemination of the digital topographic maps between NAMRIA and MinDA. Regarding financial aspects, both organizations have secured stable budgets and as mentioned above, the technical training for LGU users of the digital topographic maps is planned and budget acquisition directly from the central government budget is carried out by the implementing agency and others in 2017. However, according to the MinDA official, it is difficult to acquire the ability to utilize the data for GIS applications by participating in a one-time training, and many LGUs require further training. At the time of ex-post evaluation, NAMRIA continues to correct a part of the digital topographic maps, and the distribution and utilization of data for GIS applications were not initiated in Mindanao, including to MinDA. So, it was not possible to confirm the actual utilization and handlings by the LGU which are the main users. In addition, the recognition of the recommendations of the final report on the necessity of nurturing the environment for utilization of the digital topographic maps, policies for formulating development plans and personnel placement, was low by the implementing agency and others. Thus, it could not be confirmed whether or not the financial resources for promoting the use would actually be secured. Therefore, sustainability of the project effects is fair.

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

### **4.1 Conclusion**

The topographic map at a scale of 1:50,000 of Mindanao which was not updated since the printed map was produced in the 1950's. This project updated the information gathered by new satellite imageries and field identification and developed the digital topographic maps. For the overall goal, the project aimed for the development projects in the Mindanao area to be implemented in the future by utilizing the maps in planning the development planning of the regions. This project is fully consistent with the development policies and development needs of the Philippines and Japan's ODA policy, and thus, the relevance is high. By this project, new information required for production of the digital topographic maps was collected by satellite imagery and field identification. However, as a result of the verification of the data for printing, the data for GIS applications and the updated printed maps by NAMRIA after the completion of

the project, NAMRIA judged that the digital topographic maps as final products have not reached the level acceptable as completed products. Moreover, although the map users, mainly LGUs, received information on how to utilize the digital topographic maps, it cannot be judged that the knowledge and skills for utilization had been conveyed. Furthermore, regarding the recommendation for the environment of utilization of the digital topographic maps, the recognition and ownership of the implementing agency and others are low, and so, it cannot be judged that the knowledge for improvement of environment for utilization was conveyed. Thus, the project purpose has not been achieved. Regarding the overall goal, after the completion of the project, among the digital topographic maps, the data for printing was corrected and approved and all the map sheets of the updated printed maps were printed. But, the awareness of the users about the issued maps is low and the actual utilization is limited. The data for GIS applications has been corrected and has not been distributed except a few cases, and so, actual utilization is very limited and it was difficult to confirm the status of utilization at those few destinations. Thus, the effectiveness and impact are low because the realization of the effect from the project implementation was not confirmed. The project cost was within the plan. Although the project period was extended based on the change of the plan, it cannot be judged that the data for GIS applications has been completed at the time of completion of the project. Accordingly, the efficiency at the time of completion of the project is fair. Regarding sustainability, there are no major problems in terms of the policy background and technical aspects. With respect to the organizational and financial aspects of the implementing agency and others, it cannot be judged whether or not it will be directed to actual utilization as the data for GIS applications has not been completed. Therefore, the sustainability of the project effects is fair.

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

**【Column: JICA's Performance】**

1. Supervision and Response to problems

This project was completed in March 2013. The evaluation report of digital topographic maps, the data for printing and the data for GIS applications, was submitted by NAMRIA in response to the request letter issued by JICA in November 2013. By this report, it was confirmed officially that there were problems in the accuracy of the digital topographic maps. By March 2014, the Consultant through JICA carried out the correction on the digital topographic maps, the data for printing and the data for GIS applications, and the corrected version was submitted to NAMRIA. As a result of the verification by NAMRIA, the data for printing was approved and the updated printed maps were printed by NAMRIA by June 2016. With regard to the data for GIS applications, the topographic maps with satisfactory accuracy for NAMRIA has not been completed, but JICA has recognized that the correction was

completed by the work carried out in 2014.

However, in the above letter issued by JICA to NAMRIA, JICA stated that JICA intended to assess whether the Consultant was responsible for items to be corrected when there were inconsistencies in the digital topographic maps. Moreover, JICA stated that they could not proclaim the project as completed as NAMRIA expressed that there were inconsistencies in the topographic maps. Thus, JICA had recognized that problem was occurring at that time, and it was necessary for JICA to make sure that the contents of work and its completion would be made for the correction by the Consultant. However, after the Consultant carried out the correction work in March 2014, JICA did not confirm to NAMRIA and the Consultant if the digital topographic maps were completed or not. According to the Consultant, it was verbally agreed with NAMRIA that the correction work had been completed, but there is no record of agreement by written document. The Consultant said that they reported to JICA that the correction work was completed, but it was verbal and there were no record by written document about reporting in JICA. According to the director of MGB, NAMRIA, they have not received any official response from JICA to NAMRIA's evaluation report by the time of ex-post evaluation. JICA recognized that the correction work itself was completed and has not particularly confirmed with NAMRIA because while JICA has been interacting with NAMRIA for external inquiries about the digital topographic maps, NAMRIA has not mentioned about data correction in particular.

From these circumstances, between NAMRIA and the Consultant, discrepancies in opinion on the level of accuracy of the data for GIS applications continue until the ex-post evaluation. As it is difficult to confirm professionally the accuracy of the topographic maps by JICA alone, it is considered that there is room for improvement in the verification method, such as introducing a third party's verification.

From the above, one of the reasons why the problem has been continued up to the present was considered that the communication among JICA, NAMRIA and the Consultant was actually between two parties, NAMRIA and the Consultant, rather than among the three parties, for both corresponding the digital topographic maps after the completion of the project and for confirming the accuracy of digital topographic maps submitted at the time of completion of the project and after correction work. There is no record of agreement by written document. Therefore, it is judged that there was room for improvement in JICA's project supervision method such as confirmation of the certain completion of project by JICA, confirmation of written contents of communication between NAMRIA and the Consultant, acquisition of agreement record by written document, etc.

## 2. Appropriateness of response to promote understanding of the implementing agency and others for JICA projects

The implementing agency and others did not clearly understand JICA's process on how to complete the project and how to handle the final report. The Director of MGB, NAMRIA has confirmed and signed the printed maps of topographic maps and that was regarded as admitting the project completion although the verification of the accuracy of the digital topographic maps was not actually completed. It was said that this was in response to what was verbally exchanged between NAMRIA and the Consultant that even after the project was completed, work can be continued by the Consultant. The official of the MinDA had proposed setting an opportunity such as a conference or ceremony to confirm the completion of the project even during the project implementation, but it was not set. The official pointed out that eventually the completion became unclear. Regarding the final report which is the final product of this project,

acknowledgement and ownership of the implementing agency and others are low and the recognition of the contents of the recommendation was low.

NAMRIA has implemented a project with JICA even before this project, but the experience of management of ODA including other donors is rather limited. MinDA is an organization shortly after its establishment, and this project was taken over from MEDCo. There is possibility that understandings of both institutions on the characteristics and procedures of each scheme of the JICA project were not sufficient. From the above, it is judged that it was necessary for JICA to contrive to promote understandings of JICA projects and to confirm the understanding by the implementing agency and others.

## **4.2 Recommendations**

### **4.2.1 Recommendations to the Implementing Agency**

1) Consideration for the methods of promotion of distribution and PR of the topographic maps and the method of information sharing between NAMRIA and MinDA

Both agencies should consider the methods for promotion of distribution and PR of the digital topographic maps and the updated printed maps. Specifically, explanation about NAMRIA's map sales office, the information on the GeoPortal and conditions for free distribution to government agencies can be done by utilizing the opportunities of gathering of users such as a training planned by MinDA. It is recommended that NAMRIA and MinDA arrange and improve information sharing methods concerning the update and issue of the new topographic maps in Mindanao area by NAMRIA from now on.

2) Reporting the progression status to JICA

It is recommended to NAMRIA to report to JICA the progress of the production of the digital topographic maps and consult appropriate actions with JICA.

### **4.2.2 Recommendations to JICA**

It is recommended to JICA to grasp the status of the data correction work by NAMRIA as soon as possible and to discuss and clarify with NAMRIA the definitions of the accuracy of the completed products that NAMRIA can accept in order to promptly complete the data for GIS applications and to consider response from now on, together with the department in charge in JICA.

## **4.3 Lessons Learned**

1) Setting appropriate definitions to measure the accuracy of the final products and indicators

In this project, there was a discrepancy among stakeholders, especially between NAMRIA

and the Consultant on the accuracy of the digital topographic maps. This is considered to be one of the causes why NAMRIA did not approve the digital topographic maps despite the fact that correction work was also done for the data for GIS applications after completion of the project. Although the *SPECIFICATION 2008* specified by the I/A states articles for quality control of the topographic maps, it does not indicate definitions and indicators that can be shared to measure the accuracy of digital topographic maps. The indicators of the project purpose and the outputs of the produced topographic maps are also not clear and lacking in the summary and the indicators in the project documents from the planning to completion. It was important that the utilizable digital topographic maps were updated and completed at the time of completion of the project, but the difficulties to have common recognition on the standard for “utilizable” could have arisen among stakeholders. In the future, in implementing similar projects, it is important to set indicators for evaluation that clearly define specifications and accuracy for the completed products and describe in a written document as much as possible by mutual agreement with the implementing agency, and to make it possible to comprehendible in the project purpose and outputs.

## 2) Setting appropriate verification method of a product

One of the reasons why the digital topographic maps with the accuracy that NAMRIA can approve was not completed at the time of ex-post evaluation was that the time was not sufficiently secured for NAMRIA’s verification work of the topographic maps, the data for printing and the data for GIS applications, which the Consultant produced in Japan. The verification work was not completed by the time of completion of the project. In addition, as mentioned in 1), although the specifications were agreed, quality control items were not checked and definitions of the accuracy were not agreed. It is necessary to consider a method for efficient verification. It was desirable to create conditions for verification together with the implementing agency: specifically, to set a schedule that enables NAMRIA to verify regularly, to build closer communication between NAMRIA and the Consultant, and to shift a part of the work in Japan to the work by local subcontractor. If it is difficult to set appropriate conditions for implementation, for the project of topographic map production of the same scale as this project, it is considered to be necessary to set a project period with sufficient duration of verification at the planning stage.

In this project, opportunities for confirming the contents of the final products and completion of the project were not set under the witness of a third party other than the

implementing agency and the consultant. In addition, it is hardly possible for the department in charge in JICA alone to verify the accuracy of topographic maps and all the final products, as expertise is required. So, in the future, in implementing similar projects, it is considered to be effective for JICA to build a verifiable system by conducting a verification by a third party with expertise at the time of completion of the project or setting a period of warranty against defect of the consultant.

### 3) Necessity of understanding JICA's project scheme and implementation procedure

Although the time of the project completion of this project was stated in I/A, etc., it is considered that NAMRIA did not fully understand the definition of the completion of this project and how to deal with the final products. The interaction with the Consultant led NAMRIA to expect that there would be responses even after the completion of the project. This affected the way that the project was completed, as it went without noticing officially that the verification was not yet completed. As a result, it was revealed after completion of the project that the final product was not the digital topographic maps with accuracy that NAMRIA could approve. NAMRIA and MinDA have not recognized that the final report was the final product of this project and that its content was the official recommendation of the project to the GOP. Thus, the implementing agency and others have not paid special attention to the recommendations concerning the activities after the completion of the project that have impact on the achievement of the overall goal. This ambiguity is considered to affect the realization of the effect of the project. From this, in the future for similar projects, it is desirable for JICA to promote understanding of the implementing agency regarding the final products, procedures, points to be heeded for each scheme of JICA projects prior to the start of the project.

### 4) Building close communication among JICA, implementing agency and the consultant

It was necessary for JICA to fully grasp the relationship and background between the implementing agency and the Consultant. Regarding the response to the verification of the digital topographic maps, NAMRIA expected responses even after the completion of the project and disapproved the level of correction works. In the future in similar circumstances, it is important to build smooth communication among three parties as much as possible at all times so as not to hamper project implementation due to lack of communication between the two parties.

The implementing agency and others were also interested in strengthening the capacity of

users from the start of the project. Activities were carried out based on the scope at the time of ex-ante evaluation sheet and I/A. As mentioned above, many of the user's technical skill were insufficient to utilize the digital topographic maps, and it can be perceived that the overall goal was too high to achieve if it were only with the methods of technology transfer taken in the project scope. The technology transfer seminar for users and the final report for the implementing agency and others concerning the recommendations were positioned as the countermeasures for the issues that rose. However, the Consultant planned and formulated the recommendations and the seminar mainly by themselves. The implementing agency and others remained with passive recognition. As a result, as mentioned in 3), the implementing agency and others have not given importance on the contents of the recommendation of the final report. Such discrepancies of the understanding continued until the completion of the project. It is thought that the explanation before and during the project implementation and the communication in order to have a proper common understanding among the three parties about the project scope and requests and expectations from the implementing agency and others were insufficient. It is necessary to consider means of management to promote understanding in order for project stakeholders to share viewpoints from planning stage.

Furthermore, as in this project, for responses to discovered issues regarding final products after the completion of a project, it is recommended that JICA and implementing agency and others recognize the magnitude of project effects that can be appear when a final product is completed, and that a JICA overseas office cooperate closely with the implementing agency and others in a timely manner, mutually confirms the progress status of a project and works readily to correct final products.



Attachment: Table 1 History of Changes of PDM

1) Ex-ante Evaluation Sheet (2009)

	Summary	Indicator
Overall Goal	By utilizing the digital topographic maps in the development planning of the Mindanao area, development projects in the Mindanao area will be implemented efficiently in the future.	Indicator: Actual utilization of the digital topographic maps (Title of project and Title of plan)
Project Purpose	The digital topographic maps at a scale of 1:50,000 in all the regions in Mindanao is produced	Indicator: Produced topographic maps
Output	Output 1: Documents required for producing the digital topographic map is collected.	Indicator 1: Gross area of acquired satellite imagery
	Output 2: Ground survey required for producing the digital topographic map is implemented.	Indicator 2-1: Number of control points and products Indicator 2-2: Number of pricking (leveling) points and products Indicator 2-3: Gross area of field identification
	Output 3: The work in Japan required for producing the digital topographic map is implemented.	Indicator 3-1: Orthophoto data Indicator: 3-2: Produced topographic map
	Output 4: Concerned people of the Philippine side (MEDCo and related agencies) can utilize the map.	Indicator 4: Number of seminar participants

2) I/A (January, 2010)

	Summary	Indicator
Overall Goal	* Not stated	* Not stated
Project Purpose	①The preparation of the digital topographic maps covering as shown in Attachment 1 at the scale of 1:50,000. ②The Implementation of the necessary support on wide and effective use of the digital topographic maps and GIS.	* Not stated
Output	Output 1: Review of Existing Conditions: Existing conditions relevant to the Project including organization set-up, mapping system, facilities management and control points shall be reviewed.	* Not stated
	Output 2: Satellite Imagery: Satellite Imagery at the appropriate scale covering as shown in Attachment 1 shall be acquired.	* Not stated
	Output 3: Map Production for covering the area as shown Attachment 1: Map production shall be undertaken using digital mapping technology in accordance with survey Operation Manual of JICA (for National Base Map)(2006).	* Not stated
	Output 4: Dissemination of the Final Products: Recommendations for the wide and effective use of the topographic data produced under the Project shall be prepared.	* Not stated

3) Final Report (March, 2013)

	Summary	Indicator
Overall Goal	* Not stated	* Not stated
Project Purpose	①Production of 1:50,000 digital topographic maps in all the regions in Mindanao: In accordance with the Rule and Regulations on Survey and Mapping, the digital topographic maps at a scale of 1:50,000 are produced as utilizing satellite stereo images, ground survey and existing topographic maps. ②Technical assistance required for the usage of the digital topographic maps: The Project Team studies current uses of maps in organizations of the TCC members. Based on the result of the study, the Project Team presents an example application at the technology transfer seminar.	* Not stated
Output	* Not stated	* Not stated
	* Not stated	* Not stated
	* Not stated	* Not stated
	* Not stated	* Not stated

4) Created for Ex-post Evaluation

	Summary	Indicator
Overall Goal	By utilizing the digital topographic maps in the development planning of the Mindanao area, development projects in the Mindanao area will be implemented in the future.	Indicator: Actual utilization record of digital topographic maps (title of project, title of plan and use, recognition and referenced situation)
Project Purpose	The digital topographic maps at a scale of 1:50,000 of the Mindanao area, which can be utilized for development plan of the province / region level in the Mindanao area, is updated, and stakeholders utilizing the map recognize the method of utilizing the topographic map.	Additional Indicator 1: The topographic maps are composed with the information by field identification according to the survey standard and update information based on the latest images. Additional Indicator 2: The necessary knowledge and skills for updating and utilizing the topographic maps are conveyed to the stakeholders.
Output	Output 1: Satellite Imagery at the appropriate scale covering the area shown in Attachment I of I/A shall be acquired.	Indicator 1: Gross area of acquired satellite imaginary
	Output 2: Existing conditions relevant to the Project including organization set-up, mapping system, facilities management and ground control points shall be reviewed.	Indicator 2-1: Number of ground control points and products Indicator 2-2: Number of pricking (leveling) points and products Indicator 2-3: Gross area of field identification
	Output 3: Map production shall be undertaken using digital mapping technology in accordance with Survey Operation Manual of JICA	Indicator 3-1: Orthophoto data 3-2: Produced topographic maps
	Output 4: Recommendation for the wide and effective use of the topographic maps produced under the project shall be prepared.	Additional Indicator 4: Contents of realistic recommendation and method of recommendation