

Summary Results of the Terminal Evaluation

I. Outline of the Project	
Country: Kingdom of Morocco	Project title : Capacity Development of Fisheries Resources Monitoring for Sustainable Management of Small Pelagic Resources in the Kingdom of Morocco
Issue/Sector: Agriculture and Fisheries/ Fisheries	Cooperation scheme : Technical Cooperation
Division in charge : Team 2, Agricultural and Rural Development Group 1, Rural Development Department,	Total cost : 268 million Yen
Period of Cooperation (R/D): 2010/7/1 ~ 2015/6/30 (Five years)	Partner Country's Implementing Organization : National Institute for Fisheries Research (INRH)
	Supporting Organizations in Japan : Hokkaido University, Tokyo University of Marine Science and Technology, Fisheries Research Agency, and Hokkaido Research Organization
	Related Cooperation : Construction project of a Fisheries Research Vessel and Project for construction of central laboratories of the National Fisheries Research Institute
<p>1. Background of the Project</p> <p>In the Kingdom of Morocco (Morocco), fisheries are one of the most important industries that generate foreign exchange revenue and provide means of livelihoods for many coastal communities. In a coastal fishery, small pelagic fish such as sardine is important income resources for small scale fishermen. However, small pelagic fish shows a decreasing trend in catch recently and an adequate fishery management for sustainable use of fisheries resources is on high demand. The Government of Morocco has been well-aware of the situation above and strategic document of the fisheries sector development/management, "Plan Halieutis (2009-2020)," clearly stresses the importance of formulation and implementation of fishery management measures based on scientific knowledge of the resources.</p> <p>As small pelagic resources have wide distribution and the amount of the resources fluctuates largely, it is considered that the assessment of the resources is difficult. It is required to improve the accuracy and reliability of the resources assessment.</p> <p>Introduction of comprehensive assessment of the small pelagic resources is necessary and such task can be achieved through improving accuracy of acoustic survey and analysis along with integration of supplemental information such as oceanographic conditions, ecology and biology of target species, catch and fishing effort, and socioeconomic status of fishers, etc. at Headquarters in Casablanca and Regional Center in Agadir of National Institute for Fisheries Research (Institut National de Recherche Halieutique; INRH), Ministry of Agriculture and Marine Fisheries (Ministère de l'Agriculture et de la Pêche Maritime; MAPM). For this purpose, the Government of Morocco made a requested to the Government of Japan for technical cooperation project.</p> <p>In November 2009, both sides signed Record of Discussion (R/D) and the Project "Capacity Development of Fisheries Resources Monitoring for Sustainable Management of Small Pelagic Resources in the Kingdom of Morocco" started in July 2010 with cooperation period of 5 years.</p>	

Approaching to the completion of the project in June 2015, JICA decided to conduct a joint terminal evaluation with the objectives of verifying and analyzing the achievement of project purpose and outputs, the implementation process, evaluating the Project in terms of five evaluation criteria and compiling a joint review report based on the survey results.

2. Project Overview

The project is to transfer to INRH the technology for fishery resource assessment and analysis method and to enhance INRH capacity to conduct continuously reliable resource assessment, in order to carry out appropriate resource management of small pelagic fish with a decrease in catch in recent years.

(1) Overall Goal

Appropriate management measures for small pelagic resources are formulated and implemented based on the comprehensive assessment.

(2) Project Purpose

Comprehensive assessment of the small pelagic resources is continuously implemented by INRH.

(3) Outputs

(Output1) Fundamental sets of information for effective acoustic survey are obtained.

(Output2) Survey planning /implementation and analysis of acoustic data are improved.

(Output3) Supplemental information is integrated for the resources assessment of the target species.

(Output4) Analysis and assessment of the status of the target species are improved.

(Output5) Project outputs are shared by the national stakeholders and regional partners.

(4) Inputs

Japanese side : Total cost 53,909,000 Yen

Experts	13 Experts	Equipment	20,731,000Yen
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Local cost	33,178,000 Yen	Trainees	17 counterparts
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Moroccan side : Total cost 11,518,000 Yen

Counterparts (C/Ps)	57 C/Ps	Provision of office space (Casablanca and Agadir)
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Local Cost	11,518,000 Yen
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II. Evaluation Team

Members of Evaluation Team	Mr. Isao KOYA	Leader	Senior Advisor to the Director General, Rural Development Department, JICA
	Mr. Sei KIMURA	Cooperation Planning	Deputy Assistant Director, Rural Development Department, JICA
	Mr. Akira OGASAWARA	Evaluation and Analysis	Consultant, VSOC Co., Ltd.
	Mr. Aomar BOURHIM	Leader	Executive at the Direction of Cooperation and Legal Affairs (DCAJ), Moroccan Counterpart of the JICA Expert at DMP, MAPM
	Mr. Abdelaziz ZOUBAI	Member	URD, Biostatistics and Information System, INRH
	Dr. Reqia SAGOU	Member	Head, Service of Programs and Scientific Processes Audit, INRH

Period of Evaluation	2015/ 2/22~3/14	Type of Evaluation : Terminal Evaluation
III. Results of Evaluation		
3.1. Measurement of Results		
(1) Prospects of the project purpose		
<ul style="list-style-type: none"> - C/Ps are developing the implementation plan with the assistance from Japanese experts, intending to promote and accelerate project activities for the remaining period and after the project termination. In the plan, INRH proposes concrete actions and time series to practically apply Virtual Population Analysis (VPA) model analysis and concept of fisheries resource movement to annual resource assessment reports and to design of the internal validation process of parameters in the resource assessment sector in INRH. - Capacity development of C/Ps has been achieved to some extent since they have practically experienced the process of developing comprehensive assessment of the small pelagic resources. - It is judged that the project purpose would be achieved at the end of the Project. 		
(2) Output 1		
<ul style="list-style-type: none"> - TSs of the five (5) target species groups were obtained (TSs of <i>Sardina pilchardus</i>, <i>Sardinella aurita</i> and <i>Sardinella maderensis</i> from the Project and in-situ TSs of <i>Scomber japonicus</i> and <i>S. pilchardus</i> based on historical survey data). Statistically obtained TS data were assembled into data base from monospecific fish school information. Also, acoustic data from the Nansen program and Morocco-Russian survey with RV Atlantnero were assembled into database. Finally, a report of the obtained TSs was developed as a manuscript of an international journal, <i>Fisheries Science</i>, to be submitted in March 2015. - Output 1 has been produced at a satisfactory level at the time of the evaluation. Output 1 will be achieved in the termination of the project implementation. 		
(3) Output 2		
<ul style="list-style-type: none"> - Surveys have been gradually revised since 2010 with the Project. Transects were designed in systematic parallel design from spring 2012 based on the on-board technical investigation with Japanese expert. The modifications or improvement of the designs of the surveys were always reflected to the official INRH survey plans. - Output 2 has been produced at a satisfactory level at the time of the evaluation. Output 2 will be achieved in the termination of the project implementation. 		
(4) Output 3		
<ul style="list-style-type: none"> - A total of seven (7) attributes of resource/ecosystem are incorporated into the GIS database established by the Project. - Output 3 has been produced at a satisfactory level at the time of the evaluation. Output 3 will be achieved in the termination of the project implementation. 		
(5) Output 4		
<ul style="list-style-type: none"> - Annual assessment report that has incorporated the results of the comprehensive assessment is not published yet. However, C/Ps have learned how to formulate short versions of annual assessment reports, referring to the Japanese formatting of short version. Outcomes need validations for completion of applications based on the present implementation plans. 		

- The Evaluation team judges that capacity development of C/Ps has been achieved to some extent since they have practically experienced the process of application of improved methodologies and suggested Japanese templates.
- Output 4 has been produced at a certain level at the time of the evaluation. Consequently, Output 4 would be achieved at the termination of the project implementation.

(6) Output 5

- The Project has held technical seminars and workshops twelve (12) times since the commencement of the Project, where Japanese experts provided technical skills, Japanese experience on resource assessment and concepts of resource assessment methodologies. Outcomes/ achievement of the Project were presented in the 38th Larval Fish Conference, the 16th IIFET conference and WGFAST meeting.
- Furthermore, trainees for training in Japan shared the results and outcomes of the training after the training through internal meetings. Outcomes of the Project such as reports, manuscripts, papers, and the relevant data are secured in an internal network server for easy access for C/Ps. Proceeding of the regional seminar will be reissued in May 2015.
- Output 5 has been produced at a sufficient level at the time of the evaluation. Output 5 will be achieved in the termination of the project if proceedings of the postponed regional seminar are developed and the seminar is actually held before the end of the Project period.

3.2. Summary of Evaluation Results

(1) Relevance

- The relevance of the Project is high.
- In Morocco, the fishery sector is one of the important industries accounting for 2.0% of GDP, 10% of total exports and 50% of agricultural, forestry and fishery exports. For this fishery sector, Plan Halieutis (fishery plan), which has been set as the target year for 2020, aims to create a sustainable and competitive fisheries industry. In the Plan, it is important to make sustainable use of resources by formulating and implementing means of fishery resource management based on scientific fishery resource assessment. INRH, counterpart organization of the Project provides scientific data concerned to fishery to the Ministry of Agriculture and Marine Fisheries, and the Ministry formulates and reviews the fishery policy based on the data. INRH has actually conducted small pelagic fish resource surveys using survey vessels and has provided scientific data on the resources. On the other hand, small pelagic resources are important source of income for coastal communities, but in recent years the decrease of the resources has been pointed out. It is said that small pelagic resources is difficult to assess because the resources are widely distributed and the fluctuation of resource size is large, so INRH couldn't assess before the Project. Under this situation, the Project started in order to improve further accuracy of acoustic resource survey and analysis as well as to improve accuracy and reliability of resource assessment through integration of data from the acoustic survey and other surveys.
- In Japan's "Country assistance policy to Morocco" emphasizes "Japan contributes to strengthening Morocco's economic competitiveness and economic growth, including job creation and industrial promotion, through the development of infrastructure which is the basis of the industry, the training of human resources as well as the promotion of the main industry such as agriculture, fishery and etc.
- This project is in line with the policies of Morocco, needs of target groups, and Japan's assistance

policy to Morocco, and the approach is appropriate.

(2) Effectiveness

- Effectiveness of the Project is relatively high.
- In Morocco, the target strength (TS) of the target fish species had not been identified yet, and TS of Atlantic herring (*Clupeaharengs*) had been substituted in the analysis of acoustic survey results. As a result, the estimation error of amount of fish school was large. In addition, there was a lack of knowledge about statistical methods for spatiotemporal analysis of acoustic survey results. In Output 1, TS of 5 target fish species was obtained, and estimation errors were minimized and statistical methods were improved. In Output 2, the acoustic survey itself has been improved and the quality of the data from the acoustic survey has been improved. It is necessary in the resource assessment to take into account environmental changes and the impact of fisheries, and it is important that comprehensive assessment is made with relevant information such as information of marine and marine organism, catch and catch effort and socio-economy. However, Morocco had not taken into account anything other than data obtained from acoustic surveys. In Output 3, data other than acoustic surveys were also integrated into the GIS database. The results of resource assessment are not significant unless they are accurately understood by fisheries policy makers and resource managers and used to formulate specific resource management measures. Therefore, it is necessary to compile the results of resource analysis/ assessment into an annual assessment report that includes scientific recommendations on resource management methods. In Output 4, the Project aimed make the assessment results compiled into an annual assessment report, but it was not reflected in the report at the time of this evaluation survey. The outputs of the Project are useful for researchers in INRH other than those involved in the Project and for regions other than Morocco. In particular, it can be expected to be used for assessment of small pelagic resources in Northwest African countries other than Morocco. In addition, acoustic survey methods and data analysis methods that are improved in the Project are expected to be used for regional resource assessment and management. In Output 5, the Project aimed to promote sharing of outputs of the Project within Morocco and with Northwest African region. The outputs have been shared within Morocco as planned, but they have not been shared yet.
- Although there are some unachieved outputs, the almost outputs of the Project purpose has been achieved and the logical structure of each output is clear and effective.

(3) Efficiency

- The efficiency of the Project is relatively high.
- The Project has been implemented smoothly in spite of two-month suspension of the Project in 2012. The collaboration of the grant aid project and the provision of the research vessel “Al Amir Moulay Abdallah” enhance the efficiency of the Project.
- Application of VPA method for resource assessment consequently functioned as the platform of communication and collaboration among different laboratories. Consequently, smooth communication within INRH increase the efficiency of the Project.
- With regards to quality and quantity of input from the Japanese side such as dispatch of experts, provision of equipment, operational cost and trainings in Japan are highly appropriate.
- With regards to quality and quantity of input from the Moroccan side, Moroccan researchers appropriately were assigned. Most of the main C/Ps have been involved with the Project since the commencement, which contributes to the efficiency of the Project.

- The Moroccan side shared satisfactory cost for project activities and provided office facilities and office space in Casablanca and Agadir. A total of 40 researchers are currently working for the Project out of 57 Moroccan researchers in total have assigned.

(4) Impact

- The impact of the Project is relatively high.
- Regarding the overall goal indicator “resource management for small pelagic fish is implemented”, the concrete management strategy for small pelagic fish resources has not yet been established and implemented based on the results of resource assessment. The results of resource assessment of the target fish species provided by INRH for MAPM are indispensable scientific information in order to carry out administrative measures as necessary such as setting a prohibited fishing period, amount of annual catch and catch efforts. In addition, an implementation plan with the main policy of disseminating the results of the Project and continuing the operation of the newly adopted Fishery Resource Assessment Model (VPA) has been prepared. In the future, if INRH will carry out this implementation plan and MAPM will actively utilize the assessment results of INRH and reflect them in better fishery resource management policies, it can be expected to achieve the overall goal through resource management of small pelagic fish based on the results of the Project.
- Other than the Overall Goal, following impacts have been observed.
 - By applying the VPA method, which requires cooperation and collaboration among researchers from various fields, the resource assessment process itself functions as a platform for promoting communication among researchers. In addition, by applying the VPA method, sharing of data and information was promoted among related laboratories in INRH, and it became possible to handle integrated research issues as INRH.
 - Inspired by joint research with Japanese experts and experience of training in Japan, C/Ps have autonomously developed their research, such as trying to expand their experience into an ecosystem model that is recognized as a more integrated resource assessment model.
 - As researchers in INRH reconfirmed the significance of cooperation with socioeconomic surveys and acoustic surveys which had so far been conducted for independent research, the activities of INRH will be activated and pilot surveys on the Atlantic coast of Morocco will be newly started by C/Ps.
 - The results of the Project can be scientific knowledge that can be applied to Northwest African countries sharing the same small pelagic fish resources. Morocco has obtained several technical results, through the Project. The Project can contribute to the improvement of Morocco's international status in promoting regional cooperation activities for the management of small pelagic fish, which are shared fishery resources.
- There is no concrete negative impact at the time of the terminal evaluation.

(5) Sustainability

- The efficiency of the Project is relatively high.

(i) Political and institutional aspects

- In Morocco, the fishery is one of important industries from the viewpoint of foreign currency acquisition and livelihood of local communities (artisanal fishermen). The importance of fishery management based on scientific fishery resource assessment is emphasized in the medium-term development strategy of fishery sector “Plan Halieutis.” In the future, scientific fisheries resource

assessment data will be essential for the Ministry of Agriculture, Marine and Fisheries (MAPM), and activities of the Project will continue to be implemented in terms of policy. INRH, the C/P institution for the Project, is only a public fisheries research institution in Morocco and has responsibility for providing scientific fishery resource assessment data to MAPM unitarily. Therefore, the outputs of the Project are expected to be sustained.

- Political sustainability is high since INRH is the only public research institute in the fisheries sector in Morocco for MAPM. The political support due to the high necessity of the Project is expected after the termination of the Project.

(ii) Organizational aspects

- INRH has the central laboratory of Casablanca as a center of INRH, five regional centers, eight marine environmental monitoring stations and two special research centers. 9 research facilities among them were involved in the Project. As of 2001, there were 214 researchers (of which 65 were women), 46 ship staff, 90 management department staff, and 50 other staff, totaling about 400 people. The total number of staff has been increased by 50 along with “Plan Halieutis.” In order to sustain the outputs of the Project, activities in the fields such as oceanography, ecology, socioeconomics, genetics, acoustic surveys, and resource assessment methods need to be mutually linked. It can be said to properly allocate human resources in INRH. However, it is necessary to reorganize the organization structure of INRH in order to continue and develop the collaboration among related departments realized by introducing the VPA method in the Project.

(iii) Financial aspects

- INRH shared satisfactory amount of project activity cost for research activities from 2010 to 2015. Although it is not possible to make a statement as to whether a sufficient budget will be secured to sustain the outputs of the Project after the end of the Project, it is expected that a certain degree of financial sustainability is ensured. It is because these activities are consistent with the sector development strategy “Plan Halieutis” in which the target year is 2020 and INRH have taken necessary measures such as creating a business proposal to secure the necessary activity budget in the Project.

(iv) Technical aspects

- C/Ps have acquired the ability to continue the research on fishery resource assessment independently after the Project by utilizing the outputs and experiences of this project.
- C/Ps are making efforts to share knowledge with other researchers, such as presenting knowledge gained through training in Japan. In addition, they are actively trying to disseminate the survey and research methods and scientific knowledge that they obtained through the Project and that can be applied regionally to the Northwest African countries through the framework of regional organizations.
- C/Ps are well aware of the importance of the equipment provided by Japan in the Project as shared asset to INRH, and it can be expected that the equipment will be shared in INRH. However, it is necessary to determine specific operation and maintenance procedures to ensure and promote the proper operation of the equipment.

3.3. Factors that promoted realization of effects

(1) Factors concerning to Planning

- Initially, direct resource estimation method based on acoustic data was adopted in the Project as a resource assessment method, but it was highly dependent on specific research fields. At the time of the mid-term review, the activity plan of the Project was revised and the Virtual Population Analysis

(VPA) method that required integrated involvement of multiple research fields was adopted instead of direct resource estimation method. Adoption of a more advanced resource assessment method (VPA) was somewhat ambitious and there was some concern about it. But it was based on an ambitious proposal from C/Ps who gained practical knowledge through training in Japan. This adoption led to a sense of expectation for the establishment of new academic knowledge in each field and contributed significantly to resolution of some issues in project management, such as "Decreased motivation of C/Ps in the fields which were relatively less contributive to the Project" and "Lack of a sense of unity among research fields in the Project. " As a result, autonomous efforts by C/Ps to their research have been strengthened.

(2) Factors concerning to the Implementation Process

- In Morocco, researchers were originally highly individualistic, and not very active about collaboration among them, laboratories and department. However, by introducing interdisciplinary research methods through the introduction of VPA methods, mutual recognition and communication among researchers, laboratories and departments have been promoted. Japanese experts also actively supported this trend by opening an open lab and holding technical seminars and so on. As a result, the system for conducting organized research activities has been strengthened, contributing to the smooth implementation of the Project.

3.4. Factors that impeded realization of effects

(1) Factors concerning to Planning

- Nil.

(2) Factors concerning to the Implementation Process

- Nil.

3.5. Conclusion

- Applying the VPA method initiated and enhanced in the Project to fishery resource assessment encouraged smooth communication, information sharing and interaction among individual laboratories in INRH. Sufficient relevance, efficiency and impact have been achieved in the Project. It is evaluated that the Project purpose will be achieved upon the termination of the Project with satisfactory achievement level. Therefore, the Evaluation Team concludes that it is appropriate to terminate the Project in June 2015 as scheduled. However, the concrete activities should be done according to the Implementation Plan prepared in the Project for the remaining period and after the termination of the Project, such as preparing annual resource assessment reports, holding regional seminars, and clarifying concrete activities for the social-economic sector.

3.6. Recommendations

(1) Keeping the function for collaboration and cooperation among laboratories within INRH

- In order to keep collaboration among different laboratories, which is the great impact of the Project by applying VPA, it is highly recommended to maintain the function of this platform of communication for further collaboration and cooperation.

(2) Reflecting resource assessment results into management policies

- Resource assessment results of target fish species submitted from INRH are an essential scientific ground for MAPM to decide administrative measures such as setting a closed season for fishing, annual fish catches, limiting fishing efforts, etc. In order to achieve the overall goal of the Project, it is strongly recommended that the assessment results from INRH be used effectively as a valuable

information source for the better fishery resources management policies.

3.7. Lessons Learned

(i) Addressing additional topics into project activities based on the current needs of C/P

- Although VPA method was not originally planned to be introduced at the beginning of the Project, it was mutually agreed to address during mid-term review. In spite of the fact that VPA method is a comprehensive methodology and requires collaboration among different laboratories, the achievement of related activities was at satisfactory level with the ownership of C/P. Through this experience, it is recognized that ambitious topics with needs of C/P could make the ownership of C/P higher.

There are the following two points to be learned from the Project in the case of implementing projects with relatively strong academic elements with national research institutions as executing agencies.

- (1) Researchers in developing countries tend to have a strong intention of individualistic research, and there may be problems in building mutual cooperation and cooperative relationships among them to achieve the overall outcome of projects. In this regard, researchers in Japan have generally tackled research issues and produced many beneficial results in multidisciplinary approaches and a team system in which researchers in multiple fields collaborate to conduct integrated research. The usefulness of collaborative efforts in research projects is inferior to the persuasiveness of explanations on paper, but the introduction of concrete examples by practitioners at research sites in training in Japan is an effective way to improve C/Ps' awareness about necessity of collaborative efforts. In addition, by adopting research methods that require the involvement of multiple research fields (eg, VPA method in the Project), it can be expected that the operation of the method itself functions as a platform for cooperation and cooperation among C/Ps and can be useful measures for promoting organizational research activities.
- (2) In the case that C/Ps of projects are researchers, ensuring "research motivation" is an important factor in encouraging voluntary involvement in project activities. For example, if a researcher makes academic presentations at seminars and symposiums, the researcher will come to be appreciated and promoted, so C/Ps usually show high motivation for such opportunities. Therefore, it can be expected positively securing such a "formal grand stage" for C/Ps in a project will lead to effects on fostering their sense of initiative. In the Project, not only were C/Ps encouraged to make presentations about outcomes of the Project at international academic societies and seminars, but also regional seminars and technical seminars organized independently in the framework of the Project, which led to CP's passionate efforts.

3.8. Follow-up Situation

-Nil.