to secure the sustainability of them.

(1) Establishment of the ISDM model
The Sabo Technical Center (STC), which is a counterpart organization of the Project, should apply, verify and improve the ISDM model (draft) in order to be applicable in other areas (other than the model areas of the Project) widely after the Project.

(2) Strengthening of functions of STC
In order to establish and disseminate the ISDM model by STC, the strengthening of STC's function is necessary. This means that there are necessary to not only strengthen the organization status of STC in the Ministry of Public Works, but also to strengthen the linkage between STC and local governments in order to correspond disaster occurred, and to improve sustainability of accumulated technologies in STC (for example, continuation of the training courses and increase of technical staff of younger generation).

Accordingly, the Joint Evaluation Team is going to recommend following matters strongly to JICA headquarters, JICA Indonesia office and the organizations concerned in the Japanese side and the Indonesian side.

- Dispatch a long-term individual expert is necessary after the termination of the Project because the cooperation to the matters mentioned above will make contribution for expanding the outcomes of the Project. As of dispatch of short-term expert will be depend on the necessity. It is desirable to be dispatched the long-term expert to STC in Yogyakarta.

- There might be necessary to examine dispatch of expert etc., for the central government level (in Jakarta) in order to support the cooperation mentioned above, establish the ISDM model, and strengthen functions of STC from the viewpoints of comprehensive disaster management for prevention of sediment-related disaster and catchment basin sediment control management, based on the new Water Law No.7 year 2004 of Indonesian government. The framework of the support including necessity of cooperation in this regard should be examined.

- As shown in the policies of the Indonesian government and also in the Japan's ODA policy for Indonesia, disaster prevention, land and water conservation are important issues. Accordingly necessity to make efforts on these issues by both countries is high. It is considered that "Sabo" has an important role as a technology in the framework of comprehensive disaster management and catchment basin management. In Indonesia, Sabo technologies especially for disaster prevention in in-stream area have been accumulated already, and it is considered that the Indonesian side is able to utilize and apply this accumulation with initiative of the Indonesian side as an important technology in the framework. Therefore, the cooperation through the dispatches of the above-mentioned experts will be the final stage of a series of the cooperation as dispatch of long-term experts and technical cooperation projects to the Sabo oriented field such as construction skills of

dam, dyke and groundsel etc. and utilization of Sabo technology will be shifted into more comprehensive approach. In this meaning, it is judged that it is the time for making Sabo technology comprehensive from now on.

- A concrete plan for the cooperation such as inputs (including necessity of dispatch of expert etc., in Jakarta), contents of cooperation, and timings etc., should be examined among the organizations concerned later in early stage. Because the concrete plan could not be decided firmly during the terminal evaluation study and also it depends on the progress of the project activities by the end of the Project.

6. RECOMMENDATIONS AND LESSONS LEARNED

6.1 Recommendations

(1) Development and dissemination of "the technical guidelines for the ISDM"

The draft technical guidelines for the ISDM, which are basis for establishing the ISDM model and the regional disaster management system, are being developed under the Project as the results of the project activities in the Merapi model area. However, application, verification and improvement of the draft guidelines could not be practiced within the 5-years project period. Therefore, to improve the draft guidelines more general and applicable in other hazardous prone areas, it is necessary to revise the draft guidelines based on applied cases of the guidelines in some other areas, after then, the ISDM model and the regional disaster management system will be established. When the guidelines are established, it will be expected that the responsibilities of local administrative organizations in the provincial, regency and village levels in regard to the disaster management will become clear, and also it will become possible that STC makes necessary support for local governments in order to settle appropriate linkages between local governments and local residents.

(2) Verification of the technical guidelines

Several technical guidelines such as "the guideline on warning and evacuation system", "the manual to investigate sediment-related disaster" and "a system on disaster investigation to formulate appropriate disaster information transmission flow" etc., will be developed at draft level by the end of the Project. After the end of the Project, it is necessary to verify whether staff of STC and local governments can utilize these guidelines, and revise them.

(3) Verification and improvement of the popular rainfall gauges

Development of the popular rainfall gauge, which is low cost with little necessity of maintenance, has been tried under the Project. One of the rainfall gauge produced, which is automatic recording type, is scheduled to install in the Merapi model area by the end of the Project. However, there is no sufficient time to finish verification and further improvement of the automatic recording type rainfall gauge. Therefore accomplishment of verification and further

improvement of the automatic recording type rainfall gauge is necessary after the end of the Project.

(4) Strengthening of the training course/ training program for engineers

By conducting the training courses such as the WIDE course and the OJT course under the Project, engineers who can make plan of the ISDM and conduct technical support, have been developed, and target initially settled in the project plan is almost achieved. However, it was difficult to develop engineers who can implement the ISDM comprehensively. Therefore, it is recommended STC to train engineers who are engaged in the ISDM activities, by improving the curriculum of the training courses and also introducing the contents of the technical guidelines on the ISDM.

In regard to the MPBA course, which is implemented by cooperation with the Gadjah Mada University, it is surely expected that capacity development of the Indonesian lecturers will be continued and coordination by the steering committee for the MPBA course will be continued, but still it is necessary to revise the curriculum by introducing the ISDM concept in accordance with its verification and improvement in future.

The operation expenses for the MPBA course were born by the Project. The 5th batch of the MPBA course will end at March of 2007, while the end of the Project is March 2006. Therefore, the operation expenses from the April 2006 to March 2007 of the course should be decided among JICA Indonesia office, the Indonesian side and the persons engaged in the Project before the end of the project period.

Besides, it is expected that Indonesian government play a role as the nucleus of Sabo technology in the Asian region in future, based on the experiences of conduction of the WIDE course, the OJT course and the MPBA course. (For example, implementation of "third country trainings" on Sabo technology)

(5) Strengthening of functions of STC

- The current status of STC is a sub-project of the Ministry of Public Works, and it is decided that the status of STC will become a project in the year 2006. It is expected that the status of STC will be up to permanent status such as *Balai* (management unit).
- In relation with establishment of the ISDM model and the regional disaster management system mentioned above recommendation (1), linkage between STC and local governments should be strengthened further.
- It is important to sustain accumulated technologies at STC. In order to assure technical sustainability of STC and considering advanced age of STC technical staff, allocation of staff of younger generation is expected.

(6) Role of Sabo technology for comprehensive disaster management and for catchment basin management in relation with the new Water Law No.7 year 2004 of Indonesia

The roles of Sabo technologies in comprehensive disaster management and in catchment basin management are already clear in the new Water Law No.7 year 2004 of Indonesia. For the future cooperation between Japan and Government of Indonesia to facilitate the assistance on how the Sabo technology can contribute on the land and water conservation, and catchment basin management in off stream area should be conducted. This cooperation will be planned and examined in near future.

6.2 Lessons Learned

- As a basic framework of the Project, cooperation between STC and local governments, and between local governments and local residents are key issues in order to establish the ISDM model and regional disaster management system. The counterparts (STC and other persons concerned) didn't have experiences in regard to approach methods to local residents and communities, and should be done a series of trials and errors in the changing social circumstances such as democratization and decentralization in Indonesia. In fact, they needed considerable time in getting common understanding about the ISDM concept and necessity of the establishment of integrated disaster management system.

- In case that a project, which includes cooperation between administrative organizations and local residents, not only technology-oriented approach but also social and economical approaches should be introduced from early stage of the project period from the viewpoints such as 1) participation of local residents and local communities with their initiatives, and 2) improvement of their mutual assistance and self-help. Experts in the filed of the participatory approach and the community disaster management should be dispatched from the beginning of the project period, for example, in order to prepare hazardous maps and warning and evacuation system with initiative of local residents and local communities.