

Annex No.16
News Letters

THE STUDY ON
COUNTERMEASURES FOR SEDIMENTATION
IN
THE WONOGIRI MULTIPURPOSE DAM RESERVOIR
IN
THE REPUBLIC OF INDONESIA

FINAL REPORT

SUPPORTING REPORT III

Annex No.16: News Letter

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News Letter
No.1

December 2004



December 2004

News Letter

No 1 :
Overall Study Information

Japan International Cooperation Agency
Directorate General of Water Resources
Ministry of Public Works
The Republic of Indonesia



Nippon Koei Co., Ltd.
Yachiyo Engineering Co., Ltd.



Highly Erosive Farmed Uplands in the upper Tirtomoyo River dividing from the Keduang Watershed



View of the Wonogiri Dam Reservoir



JICA Japan International Cooperation Agency
Head Office
6-13F, Shinjuku Maynds Tower
1-1, Yoyogi 2-chome, Shibuya-ku,
Tokyo 151-8558, Japan
Tel: +81-3-5352-5311/5312/5313/5314
Website: <http://www.jica.co.jp/>

Directorate General of Water Resources
Ministry of Public Works
Jl. Patimura No.20
Kebayoran Baru,
Jakarta Selatan 12110, Indonesia
Tel: (+62)-21-7222804
Fax: (+62)-21-7261956

Project Bengawan Solo (PBS)
Jl. Raya Solo-Kartasuna Km.7
Surakarta 57102, Indonesia
Tel: (+62)-271-716428
Fax: (+62)-271-716428

Indonesia Office
Plaza BII, Tower II, 27th Floor,
JI M.H. Thamrin No.51,
Jakarta 10350, Indonesia
Tel: (+62)-21-3907533
Fax: (+62)-21-3907536

The Wonogiri Multipurpose Dam/Reservoir and Related Facilities

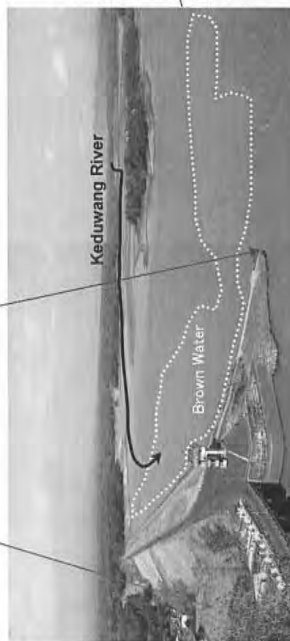


Hydroelectric Power Plant

A powerhouse is located just downstream of the Wonogiri Dam. Its installed capacity is 12.4MW. Annual energy output is about 55,000MWh.

Intake

Water for hydropower generation and irrigation is taken through the intake. Hence, its function should be secured from sedimentation to fulfill the prescribed function of the dam.



Wonogiri Reservoir (Rainy Season)

The brown colour of water flowing into the reservoir from the Keduwang River indicates high concentration of sediment in it.



Spillway Gate (View from the Reservoir)

Radial Gate: 7.5m x 7.8m x 4nos.
The gate is essential to prevent downstream areas from devastating flood damages. The reservoir sedimentation would endanger the proper functions of the spillway gate.

Wonogiri Reservoir (Dry Season)

Clear indication of significant sediment deposit in the reservoir.



Colo Weir

It is located 13km downstream of the Dam. Its command area (the Wonogiri irrigation area) extends to 30,000 ha where triple cropping is widely practiced.

Potential Sediment Sources



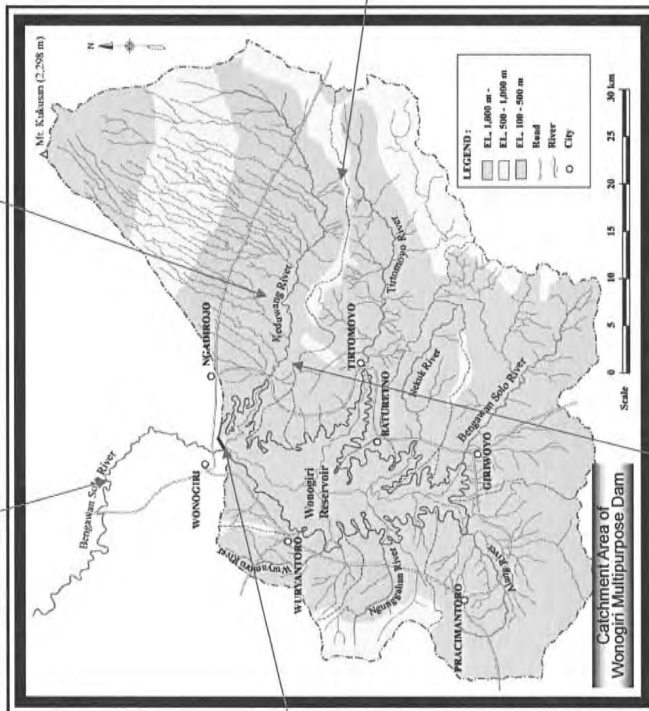
Bank Erosion

Bank erosion in the upstream of check dam No.4 on the Keduwang River.



Gully in the catchment area.

The land use change (uncontrolled deforestation, etc.) resulting from population increase accelerates the gully erosion.



Poor vegetation fragile to surface erosion

Poor vegetation in the catchment. This type of areas are highly fragile to surface erosion



Uncontrolled farming on steep-sloped uplands

This is another example of a consequence of uncontrolled land use. Inappropriate farming on steep slopes accelerates surface erosion.



Land Sliding

Land sliding occurred in the Wonogiri catchment area. (During rainy season of 2000-2001)



Existing Check Dam on the Keduwang River
Six (6) check dams have been constructed by PBS on the Keduwang River. Additional measures are still required to cope with rapid sedimentation in the Wonogiri Reservoir.

Role of the Wonogiri Dam/Reservoir

The Wonogiri Multipurpose Dam is the sole large dam on the mainstream of the Bengawan Solo River. The dam was constructed in 1982 financed by JBIC (former OECF). Since then, the dam has played the crucial role in irrigation water supply, hydropower generation and flood control for the river basin.

The Wonogiri Dam, along with the Colo Weir at 13 km the downstream of the dam and the irrigation canal system, has provided water to 30,000 ha of the irrigation area and has much contributed to realising triple cropping farming in the area.

The powerhouse attached to the dam accommodates the generating equipment with an installed capacity of 12.4 MW to provide annual energy output of 55,000 MWh.

The reservoir possesses 220 million m³ of a flood control capacity to regulate the standard highest flood discharge (SHFD) with peak inflow of 4,000 m³/s to the constant outflow of 400 m³/s (see Fig.1), which can safely be conveyed by the downstream river channels. Since the completion of the dam in 1982, Surakarta, the largest city in the Bengawan Solo River basin, has experienced no major flood.

In short, the Wonogiri Dam has much contributed to social welfare in the basin and has greatly benefited the people in the basin.

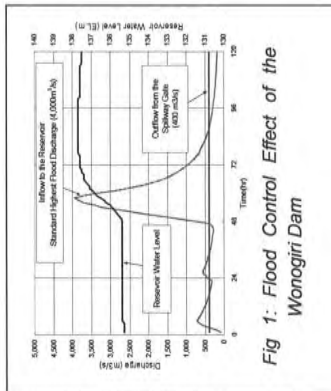


Fig 1: Flood Control Effect of the Wonogiri Dam

Reservoir Sedimentation Problem

Currently, the proper function of the Wonogiri Dam has been threatened by rapid sediment deposit in the reservoir (see Photo 1 and Photos in the beginning pages). According to a preliminary assessment, the effective storage capacity of the Wonogiri Reservoir has decreased to nearly 60% of the original design (The original effective capacity was 615 million m³).



Photo 1: Sediment Deposit in the Wonogiri Reservoir

The decline of the reservoir storage capacity reduces available water for irrigation and hydropower generation, especially during the dry season. The safety of dam against large floods also would be deteriorated due to sedimentation beyond

the designed level.

In order to sustain the function of the Wonogiri Dam, namely to secure the social welfare provided to people in the basin by the dam, the sedimentation problems in the Wonogiri Reservoir should be solved.

The Objective of the Study

The limited amount of deposit only in front of and around the intake has been removed with the grant aid of JICA for 2002 to 2004. However, this is just an urgent measure to prevent the intake from clogging by the sediment deposit. In order to recover the storage capacity of the reservoir, fundamental permanent countermeasures should be established and implemented.

Hence, aiming at establishing fundamental countermeasures to tackle with

the sedimentation problems, "the Study on Countermeasures for Sedimentation in the Wonogiri Multipurpose Dam Reservoir in the Republic of Indonesia" was commenced in August 2004 under the financial and technical assistance of the Japan International Cooperation Agency (JICA).

The objectives of the Study are

- To formulate a master plan for sustainable countermeasures for sedimentation problems in the Wonogiri Reservoir,
- To conduct a feasibility study of the selected priority project(s), and
- To transfer technology to counterpart personnel in the course of the Study.

The outline of the Study is summarised in Chart 1.

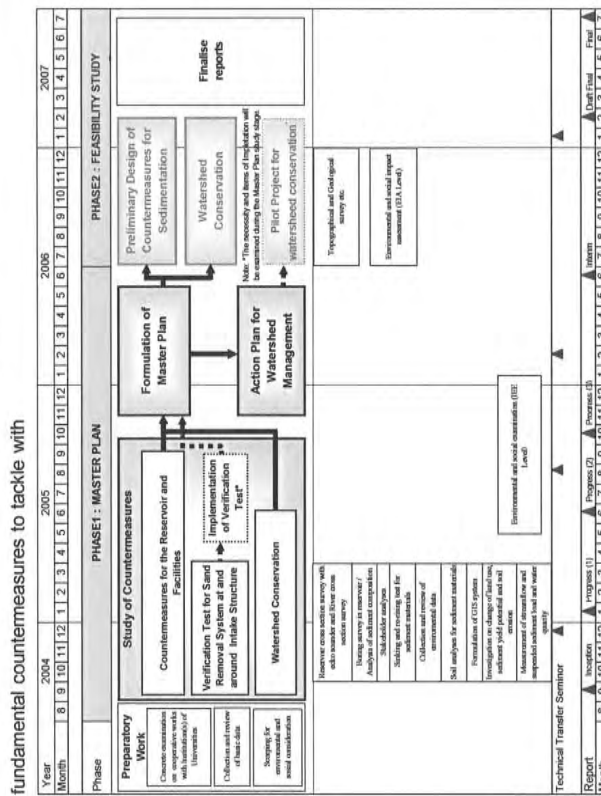
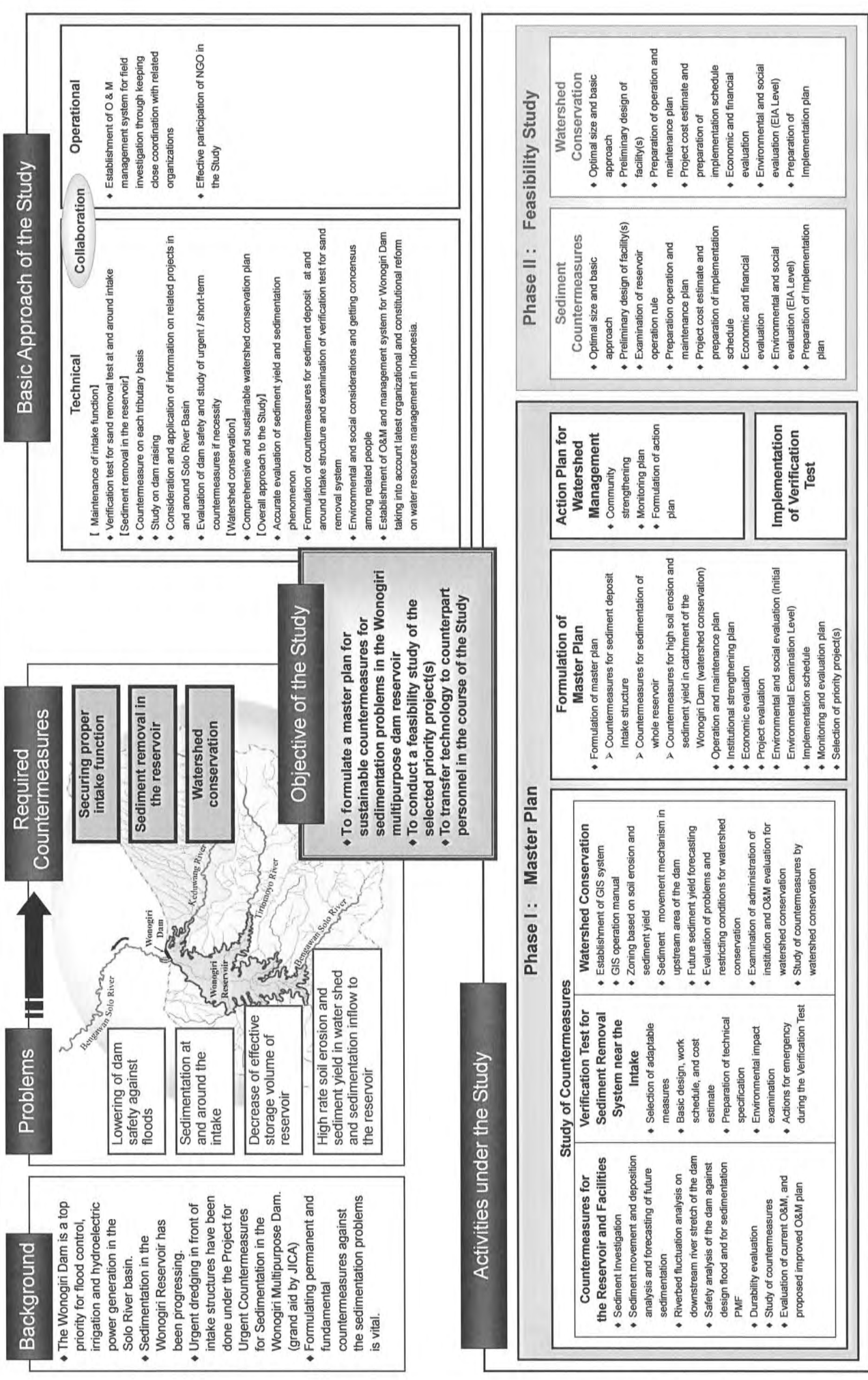


Fig 2: Overall Workflow

Chart 1: Outline of the Study



Basic Approach of the Study

The photographs on the beginning pages of this News Letter introduce various sources of sediment, but the rapid sedimentation in the reservoir is mainly resulted from an extremely high erosion rate of the Wonogiri watershed (1,350 km² containing 90 km² of the reservoir area). An eroded land like in Photo 2 can widely be observed in the Wonogiri watershed area.



Photo 2: Surface Erosion in the Wonogiri Catchment

Poorly controlled land use and farming methods in the catchment has accelerated the surface soil erosion. The following photograph shows a typical uncontrolled steep-sloped farming area in the Wonogiri catchment area, which is highly fragile to surface soil erosion.



Photo 3: Bad Example (Uncontrolled Steep-Sloped Farming Area)

Unfortunately, about 80% of the total land in the Wonogiri Catchment has been cultivated on this

type of farming areas, whilst the only 13% of the land is covered with forests.

Therefore, fundamental countermeasures to recover the storage capacity of the reservoir should aim at both removing sediment deposit from the reservoir and reducing surface erosion, flowing in to the reservoir.

Hence, the Study will have to propose

- Countermeasures for removing sediment deposit in the reservoir,
 - Countermeasures for securing proper function of the intake, and
 - Watershed conservation to cope with high surface erosion and sediment yield.
- Both technical and operational aspects will be examined, discussed and proposed to reach countermeasures.

Organisational Arrangement

The executing agency for the Study at the national level is the Directorate General of Water Resources of the Ministry of Public Works. The Bengawan Solo River Basin Development Project (PBS) acts as a counterpart agency at the site level.

The operation and maintenance of the Wonogiri Dam/Reservoir is currently conducted by PJT 1 Bengawan Solo Branch. Water released from the reservoir is utilised by PLN, PDAM, industrial water utilities and farmers organisations. Cooperation with organisations which are in charge of forestry, land use and other environment- and agroforestry- related issues are essential for planning and implementing watershed conservation. Further, grass root level organisations should also play an important role because behaviour changes of residents, such as changing farming methods, would be one of the key to achieve sustainable watershed conservation.

Therefore, to explore appropriate countermeasures for solving the sedimentation problem in the Wonogiri Reservoir and to achieve sustainable watershed conservation, a variety of organisations have to be involved in the Study.

The organisational Setup for the Study is illustrated below. The Steering Committee, which supervises overall activities of the Study, is composed of central government agencies. The Technical Working Group, which monitor

the progress, discuss issues and support the Study, is formulated by central and local levels of government agencies. The JICA Advisory Committee provides technical guidance and advices. The Study has been conducted in collaboration among the committees, the JICA Study Team and local counterpart personnel. Moreover, many other agencies are expected to be associated with the Study through the Technical Transfer Seminars.

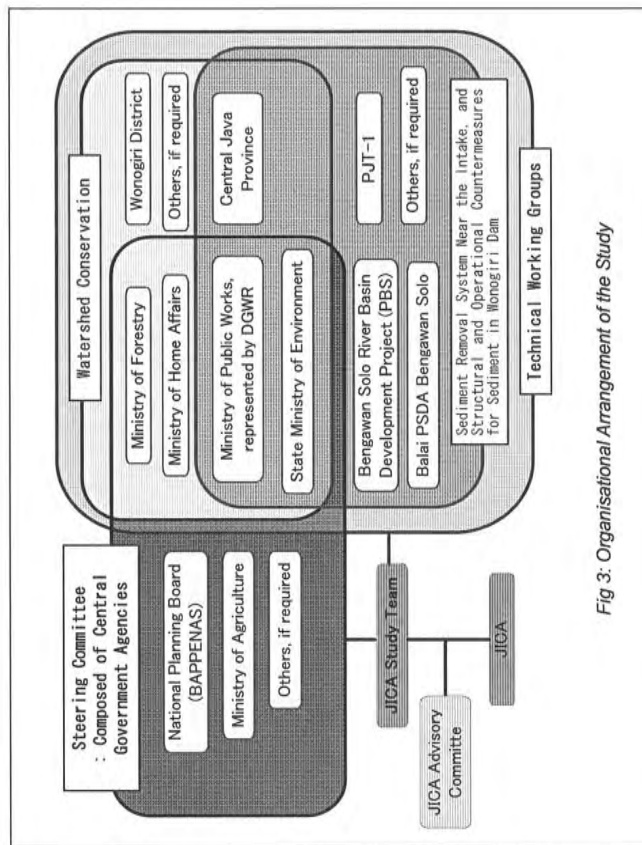
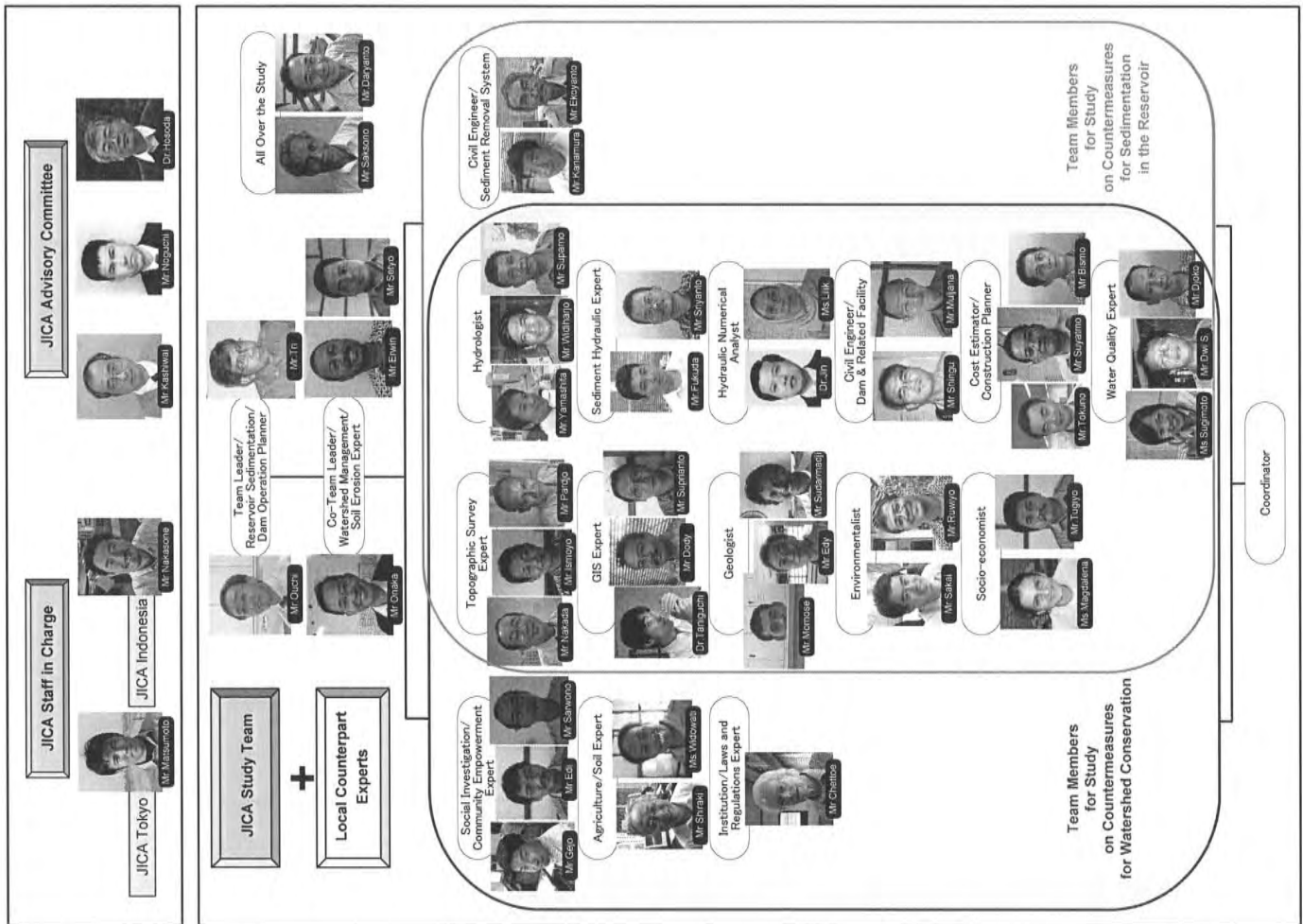


Fig 3: Organisational Arrangement of the Study



Subsequent Technical Transfer Seminars

Three Technical Transfer Seminars are scheduled to be held under the Study to explain and discuss findings of the Study at each key stage of the Study. The seminars are expected to contribute to exchanging and sharing information and opinions among stakeholders including the Study Team and to accumulating knowledge about the river basin management and watershed conservation. Tentative schedule of the seminars are shown below. All the stakeholders, including the central to local government agencies related to the Bengawan Solo River basin management/conservation, local people's organisations, NGOs, donor agencies and other related agencies, would be participants of the subsequent seminars.

Stakeholders' participation is essential for the achievement of the objectives of this Study and to the sustainable watershed conservation. All stakeholders are encouraged to participate in the study activities including the Technical Transfer Seminars.

See you at the next Technical Transfer Seminar !

Tentative Schedules of Subsequent Technical Transfer Seminars	
<p>Second TT Seminar Date: Late in August 2005</p> <p>Issues to be Raised :</p> <ul style="list-style-type: none"> Proposed Countermeasures Progress of the formulation of Master Plan <p>Exchanging opinions among all participants</p>	<p>Third TT Seminar Date: Mid-February 2006</p> <p>Issues to be Raised :</p> <ul style="list-style-type: none"> Proposed Master Plan Proposed Action Plan for watershed management <p>Exchanging opinions among all participants, especially on the above issues.</p>
<p>Forth TT Seminar Date: Mid-January 2007</p> <p>Issues to be Raised :</p> <ul style="list-style-type: none"> Proposed Feasibility Study including watershed conservation plan <p>Exchange opinions among all participants, especially on the Feasibility Study</p>	

News Letter

No.2

September 2005

September 2005

News Letter

No 2:
Introduction & Conclusion of 1st Workshop



*The Study
on Countermeasures
for Sedimentation
in the Wonogiri Multipurpose
Dam Reservoir
in the Republic of Indonesia*



Japan International Cooperation Agency
Directorate General of Water Resources
Ministry of Public Works
The Republic of Indonesia

JICA Study Team
Nippon Koei Co., Ltd.
Yachiyo Engineering Co., Ltd.



View of the Wonogiri Dam Reservoir

See You at the next Workshop !!

Please, Exchange Your Opinions among all Participants!!

JICA Japan International Cooperation Agency

Japan International Cooperation Agency (JICA)
Head Office
6-13F, Shinjuku Maynds Tower
1-1, Yoyogi 2-chome, Shibuya-ku,
Tokyo 151-8558, Japan
Tel: +81-3-5352-5311/5312/5313/5314
Website: <http://www.jica.co.jp/>

JICA Study Team
PBS Induk, Jl. Raya Solo-Kartasuna Km.7
Surakarta 57102, Indonesia
Tel: (+62)-271-730448, 742766
Fax: (+62)-271-730448



Directorate General of Water Resources
Ministry of Public Work
Jl. Pattimura No.20
Kebayoran Baru,
Jakarta Selatan 12110, Indonesia
Tel: (+62)-21-7222804
Fax: (+62)-21-7261956

Project Bengawan Solo (PBS)
Jl. Raya Solo-Kartasuna Km.7
Surakarta 57102, Indonesia
Tel: (+62)-271-716428
Fax: (+62)-271-716428

INTRODUCTION

The Study on Countermeasures for Sedimentation in the Wonogiri Multipurpose Dam Reservoir in the Republic of Indonesia was commenced in August 2004 under the technical assistance of the Japan International Cooperation Agency (JICA). The objectives of the Study are:

- To formulate a master plan for sustainable countermeasures for sedimentation problems in the Wonogiri Reservoir,
- To conduct a feasibility study of the selected priority project(s), and
- To transfer technology to counterpart personnel in the course of the Study.

In the process of planning, public consultation has been common for incorporating the various demands and needs of communities and stakeholders. The consultation process is of great importance, aiming at empowering the stakeholders in project identification and implementation. It is therefore four workshops/ technical transfer seminars are scheduled to be held under the Study and aimed to explain and discuss findings of each stage of the Study. The workshops are expected to exchange and share information and opinions among stakeholders.



Sediment deposit in the Wonogiri Reservoir

WORKSHOP I

Workshop I was held on December 28, 2004 at the Hotel Novotel Solo. A total of 124 persons participated in the 1st workshop and came from all stakeholders, including the central to local government agencies related to the Bengawan Solo River basin development and management / conservation, local people's organizations, NGOs, universities and other related agencies.



Workshop I : 28 Desember 2004

The purposes of the workshop are to:

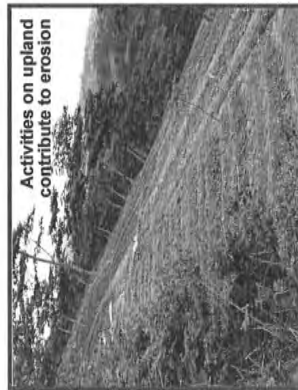
- i) Introduce the schedule and outline of the JICA Study to all the stakeholders concerned,
- ii) Grasp present the current progress and preliminary results of the Study during August – December 2004,
- iii) Introduce reservoir sedimentation and sediment countermeasures in Japan, and
- iv) Exchange opinions and obtain comments from the stakeholders to reflect further study content and master planning.

Variety of valuable comments were raised by the participants in the workshop. These comments will be reflected into the study activities as much as possible if necessary and would be subject to discussion and confirmation in this second workshop. The

whole issues were classified in the attached table. The summary of the comments is presented below.

Summary of Stakeholders' Comments

- The main problem causing the soil erosion is approved to not only natural phenomena but also human activities. Since the feeling of belonging to the environment of their society is an important factor, the Study should cover social, economical, and cultural approaches, which eventually help decrease in the soil erosion.

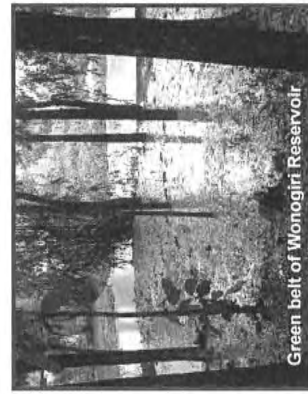


Activities on upland contribute to erosion

- This Study should consider law enforcement approach, e.g., the existing farming practice within the green belt of Wonogiri Dam Reservoir.
- Conservation of farmlands can not be achieved independently. It needs some considerations such as required infrastructures, agricultural development, procurement of farmer's needs and financial supports. The land conservation is not only the matter of government but also of local people themselves.
- The results of this Study should be made certainly based on consideration of

scientific knowledge, but not on political interests.

- The Study may be necessary to know the quantity/quality of groundwater around the reservoir.
- Alternatives of flushing sediment from the reservoir should be examined accurately. Flushing problem of sediment from upstream (reservoir) to downstream (river) must be definitely avoided.
- The Environmental Impact Assessment (EIA) study should be carried out just before the period of implementation of the priority project, or at the same time of detailed design, aiming to avoid an EIA review in accordance with the validity period, i.e., 3 years of the EIA.
- This Study should be applied as a research for action plan.
- Countermeasure for sedimentation problem is much related to water balance, hence, the water balance needs to be analyzed.
- The Study should present the utilization of the dredged sediment for other economic purpose.



Green belt of Wonogiri Reservoir

Classification of Issues of Workshop I

1. Process/Result of Study

- This study has already been on a right track. Many comments and opinions come from participants. Therefore this study had better reflect them appropriately.
- Result of the study should be applicable and be verified with the actual field condition.
- The results of this study should be certainly based on a knowledge consideration by means of not taking such kind of political interests for considerations

9. Countermeasures

- The countermeasures required should not be exactly the same in both countries (Indonesia & Japan) due to the difference of social and economic condition (Sedimentation in Japan is relatively small in quantity).
- Alternative countermeasures proposed in this study should be indeed suitable to local condition; it should not adopt directly from other experiences before examining it accurately

10. Awareness of Conservation

- An awareness of bureaucracy needs to be realized
- It had better provide public awareness to increase the conservation of watershed to common people as well as bureaucracy / decision makers.
- Management of the Dam should involve the society broadly, accurately, and incorporate related aspects appropriately
- (Local) Government should understand more deeply about an integrated management of a dam; it needs considerations not only from the bureaucracy's point of view but also from other stakeholders' view

2. Data/References

- It is necessary to use precise and valid data taken from its primary sources.
- The parameters used in the study should be projected to the time of its implementation
- It had better take previous studies as references such as fish culture (Sragen), Grand Design of Environment in Central Java (Bappenas), and pollution study (Bappedal).
- The study should present an accurate data of actual irrigated area, actual outflow from the reservoir, rainfall type, the influence of fish culture due to sedimentation.
- It is necessary to evaluate the data of land capability and suitability for the preparation of watershed management

11. Institutional Analysis

- The study should include institutional analysis, e.g. what kind of ideal institution required is to make decisions in handling of sedimentation problem and results in a new concept of the SOP (standard operation procedure) of reservoir management. The institutional concepts shall be more than one scenario
- A new organization under the department of agriculture will handle such kinds of critical land, sleeping-land, land conversion

12. EIA Study

- The EIA study should be carried out just before the period of implementation.
- Environmental study (EIA level) should be carried out in the same time of detail design. It aims to avoid an EIA review associated with the validity period of the EIA for only 3 years

13. Erosion Process

- This study had better consider an other method, e.g. RUSLE or others, that can predict sedimentation together with water availability
- USLE method needs to be combined with direct investigations or with other methods.

3. Action Plan/Research

- This study should present more clearly an action plan. Implementation must be followed according to the action plan.
- Relating to the three-year study period, this study had better implement an action research.

14. Heightening Dam

- Reliability of water should be analyzed accurately in advance associated with the plan of heightening the dam

15. Water Supply

- It is greatly expected to allocate municipal water supply to fulfill the need of the Solo city downstream
- Farmers in upper Wonogiri area have never taken water from the Wonogiri reservoir
- Study on water supply from the Kriksak reservoir had been done, unfortunately, they are not feasible
- Discussion with Directorate of Water Resources Development, Dir. General of Water Resources resulted in a proposed study of the optimization of Kriksak Reservoir in 2005
- There is a plan to build sand pockets in the east and west of Colo Weir.
- Lack of water has occurred in the past 3 years, especially on September-October, there is completely no water supplied
- How can people/farmers around the Wonogiri reservoir use the water?
- Currently irrigation water for the third cropping period in Sragen is just fulfilled with about 30% of its requirement

4. Erosion/Sedimentation

- Erosion evaluation must examine the land coverage, not the land usage only
- To minimize erosion, this study should cover either community or economic development programs, and involve social, economical, and cultural approaches.
- Pilot projects, covering one original watershed and other watershed that human activities involved, needs to prove whether the erosion is mainly caused by human activities or by natural condition
- It had better take the unsuccessful experiences in handling erosion problems as references to find out of what is the main cause (from Cilanduy watershed for an example).
- Concerning the sediment inflow, it should be considered how to decrease the trap efficiency as presented by Mr. Josuke Kashiwai
- This study had better consider/ calculate the volume of sediment resulted from sliding since the Wonogiri watershed has lots of steep uphill land that represent a potential erosion source
- It is necessary to examine sediment transport as an indicator in handling of the Wonogiri reservoir sedimentation issues in the future.
- Erosion/sedimentation is still high, even countermeasures through World Bank aid (1989-1992) completed
- Why is the erosion in Keduang lower than that in Tirtomoyo / Upper Solo?
- The crucial problem of erosion would be poverty of people.

16. Contribution to upstream

- Contribution from downstream to upstream area of Wonogiri Dam needs to be realized
- Farmers are willing to pay the water charge for regular irrigation water supply

5. Non-technical Solution

- This study should look at the whole aspects such as economy, social, culture, law, and people empowerment.
- The study should be integrated and involve many stakeholders from planning to its construction stage
- Since social problem plays an important role, this study had better discuss widely about non-technical problems

17. Dredged Sediment

- The study had better present the utilization of the dredged sediment for other economic purposes
- In Japan, the dredged sediment can be utilized for cement material, how is in Wonogiri?
- Interested in utilizing the dredged sediment for economic purposes

18. Sustainable Watershed Conservation

- Activities required for sustainable conservation need to be set up.
- Sustainable Conservation requires infrastructures, farm development, farmers' necessity and financial supports (prosperity approach)
- Land conservation does not only belong to the government but also to be the need of the people

6. Satellite Image

- Be careful of using data from satellite. The interpretation results may be different from the actual field condition

7. GIS Performance

- This study had better result in a GIS performance that can be easily understood for public communication, such as presenting of a relation between land coverage, flood, and erosion

20. Greenbelt

- The study should analyze the effectiveness of existing green belt around the Wonogiri reservoir.

21. Law Enforcement

- The study should consider law enforcement approach, e.g. Wonogiri Dam green belt area where agricultural practices are still going on

22. Water Balance

- Sedimentation countermeasure is much related to water balance; hence, the water balance needs to be analyzed

8. Sediment Removal

- Alternatives of flushing sediment from the reservoir should be examined accurately. Flushing problem of sediment from upstream (reservoir) to downstream (river) must be definitely avoided.
- The urgent countermeasure by dredging needs to be reassessed since the volume of dredging is lower than that of reservoir sedimentation
- Flushing sediment seems to be applicable by siphoning system. The period of sediment flushing should be during the wet season to avoid sediment deposition and a gradation process in the river downstream
- Sediment bypassing may be suitable for a small steep reservoir only

23. Operation & Maintenance

- The O & M of irrigation infrastructures should be clearly planned and informed in advance to adjust the cropping plan

24. Changing of Cultivation

- The study should analyze the social economic impact associated with the changing of the people's tradition in cultivation. It would be important to give solutions if the tradition is assessed as 'wrong' practices and dangerous to erosion

25. Water Pollution

- Is the sedimentation counter measure in this study going to take the water pollution into consideration related to the water law No.7/2004?

