



Boosting Local Livelihoods through  
Participatory Watershed Management in

# Indonesia

2021 Report



# BACKGROUND

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In 2015, 52 percent of the Naruan Microcatchment was threatened by severe erosion, according to a land use capability and vulnerability study.

Sited high in the Keduang Watershed of the Upper Bengawan Solo River Basin and located across two districts, Wonogiri and Karanganyar, in central Java, Indonesia, 56 percent of the microcatchment was also considered not suitable for seasonal crops and the forest cover was just over 20 percent.

The Naruan Microcatchment is dominated by very steep slopes with an annual precipitation of 2,979 mm. A growing population, forest degradation and poor farming practices on steep slopes has made the catchment vulnerable to land degradation, landslides and water pollution, leading to low-income livelihoods. However, the community was willing to undertake land rehabilitation and conservation with the support of village leaders.

The Upper Bengawan Solo Basin is also facing severe soil erosion leading to an increased sedimentation flow into the Multipurpose Reservoir of Gajah Mungkur. The functions of the reservoir to control floods, supply water for downstream agriculture and hydro-electricity are now restricted, causing national concern.

In 2017, the Watershed Management Technology Center (WMTC), under the Ministry of Environment and Forestry of Indonesia, submitted a project proposal to APFNet to develop participatory community management of the microcatchment, emphasizing soil and water conservation.

# BOOSTING LOCAL LIVELIHOODS THROUGH PARTICIPATORY WATERSHED MANAGEMENT

*Case study: Microcatchment soil and water conservation in the Upper Bengawan Solo River Basin*

Project title:	Development of participatory management of microcatchment in the Bengawan Solo Upper Watershed [2017P6-INA]
Supervisory agency:	Extension and Human Resources Development Agency Ministry of Environment and Forestry, Indonesia
Executing agency:	Watershed Management Technology Center, Indonesia
Budget in USD	
Total Budget:	\$242,784
APFNet grant:	\$97,928
Start date and duration:	September 2017 to August 2019, 24 months
Target economy:	Indonesia
Site Location:	Naruan Micro Catchment, upstream of Keduang Watershed, Upper Bengawan Solo River Basin

## OBJECTIVES:

- Improve the quality of the environment by increasing forest cover and the quantity and quality of water resources, as well as reducing the rate of erosion and sedimentation.
- Increase farmers' incomes through diversification of farm commodities, improve soil and water conservation technology and develop creative small businesses based on natural resources.
- Build capacity and increase awareness in managing and conserving natural resources.

## OUTPUTS:

- Development of integrated participatory management of the microcatchment.
- Increased stakeholders' commitment to effective participatory management of the microcatchment.
- Establishment of demonstration plots for conservation farming and watershed rehabilitation.
- Enhanced community awareness of microcatchment management.
- Monitoring and evaluation system to monitor watershed performance of the microcatchment.

EFFECTIVE WATERSHED MANAGEMENT REQUIRES AN INTEGRATED PARTICIPATORY APPROACH THAT CONSIDERS THE ROLES OF ALL COMMUNITIES, LAND USE AND THE PHYSICAL ATTRIBUTES OF THE WATERSHED.

## STEPS TAKEN IN PARTICIPATORY WATERSHED MANAGEMENT



### STEP 1

Gather microcatchment baseline data through preliminary studies.



### STEP 2

Understand and summarize the perceptions of watershed management and soil and water conservation by the local community and other stakeholders.



### STEP 3

Develop participatory planning skills and build collaborative commitment amongst stakeholders.



### STEP 4

Implement the sustainable watershed management through conservation farming and gully control construction.



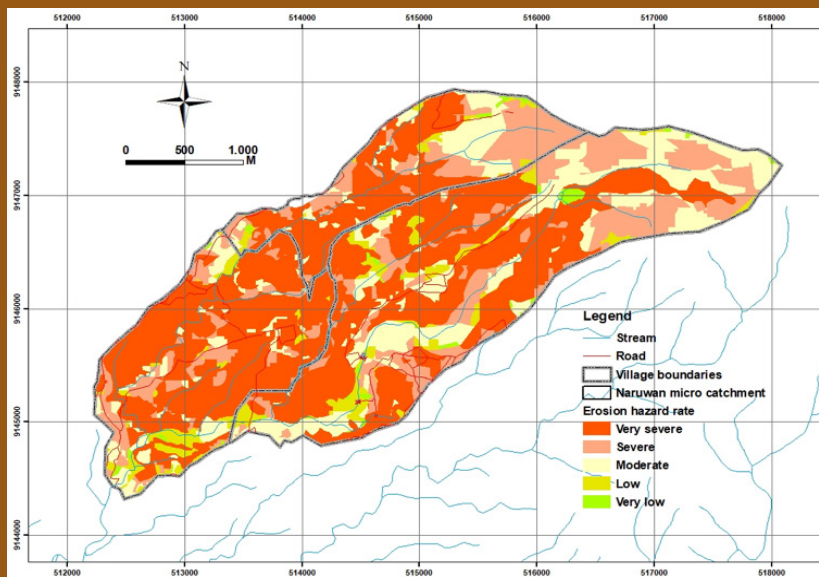
### STEP 5

Monitor and evaluate the impacts.

# PEOPLE'S PARTICIPATION IS KEY TO SUCCESSFUL AND SUSTAINABLE WATERSHED MANAGEMENT

## STEP 1 - BASELINE DATA

Preliminary studies of the microcatchment were conducted in 2015 and 2016 to collect data on the watershed's characteristics, including land use capability, number of landslides and water quality, and socioeconomic conditions. To address the main cause of erosion, agriculture, it was necessary to develop a grass-root-level participatory management plan involving not only the farmers but all stakeholders in the planning and decision-making processes.



Map of soil erosion rates in Naruan Micro Catchment, Keduang Watershed

## STEP 2 - FOCUS GROUP DISCUSSIONS

However, before making the plan, it was vital to understand the stakeholders' perceptions and expectations of the project. Several focus group discussions were conducted in three villages, Wonorejo, Wonokeling and Bubakan. WMTC used focus group discussions to build a shared understanding of the importance of integrated watershed management with stakeholders, including district governments, state technical institutions, non-governmental organizations, the private sector, as well as village representatives.

## STEP 3 - CREATE A PARTICIPATORY MANAGEMENT PLAN

Following the development of a preliminary plan which identified areas to be rehabilitated and potential agroforestry opportunities, a more detailed participatory management plan was created collaboratively by all stakeholders. Field partners, farmers whose land was selected as demonstration plots, were actively involved in planning. In total, 60 field partner households from three villages were selected with a demonstration area of 30 ha in total.

The comprehensive management plan includes implementation plans, as well as monitoring and evaluation of the watershed's performance over time. Implementation plans outlined planting patterns, perennial tree species, crops and multi-purpose tree species, gully control structures and community contribution from each household, based on the specific land condition.

*Developing participatory management plans with the local community*  
Photo credit: WMTC



## STEP 4 - SUSTAINABLE WATERSHED MANAGEMENT ON THE GROUND

Field partners not only participated in agroforestry practices and gully control construction but also contributed labour and organic fertilizer. In addition, institutional village and national stakeholders mobilized the community to apply best practices, build check dams and water infiltration wells, and facilitated village nurseries to produce one million seedlings for the three villages.



*“All parties have worked together.*

*Their participation is key to make the participatory management of the microcatchment a success. That’s why we invested a lot of effort in focus group discussions to understand the local community’s expectations, gain stakeholders’ support, confirm the role of parties in coordination and monitoring of field partners’ involvement in project implementation.”*

— Dr Agung Budi Supangat  
WMTC project coordinator

# AGROFORESTRY

Different agroforestry models were established on 30 ha demonstration plots. Full perennial (woody) tree planting was usually applied to uncultivated areas while a mixed planting pattern of perennial trees (albizia, limpaga, and burflower) combined with seasonal crops (maize, cassava) or multi-purpose tree species (avocado, durian, mango) was applied on the cultivated area. Ginger, turmeric, cardamom, and some other herbs were also planted under the trees to diversify farmer incomes. Some families used the surjan system or strip planting to grow a range of crops in the same field where annual and perennial crops are planted alternately on the land with the same slope. All demonstration plots were located on the steep slope.



Agroforestry plant seedlings.

Photo credit: WMTC

Village	Land use	Field partner planting patterns	Crops	Perennial tree species	Multi-purpose tree species	Gully structures	Household contribution
Wonokeling	Seasonal crops Perennial trees Abandoned land	Mixed pattern (61.54%) Full perennial trees (38.46%)	Maize Cassava	Albizia (100%)	Parkia, durian and avocado (53.85%) Parkia and durian (46.15%)	Small gully plugs (26) Small check dams (2)	Labour Manure
Wonorejo	Seasonal crops (60%) Seasonal crops and perennial trees (23.33%) Timber trees (6.67%) Abandoned land (10%)	Mixed pattern (86.67%) Full perennial trees (13.33%)	Maize Vegetables Tobacco	Albizia (70%) Albizia and limpaga (16.67%) Albizia and burflower (13.33%)	Avocado and durian (96.67%) Avocado (3.33%)	Small gully plugs (3) Small check dam (1) Head structure (1)	Labour Manure
Bubakan	Seasonal crops and timber plantations (42.86%) Seasonal crops (28.57%) Woody plants (14.29%) Abandoned land (14.29%)	Mixed pattern (64.29%) Full perennial trees (28.57%) Strip planting (7.14%)	Maize Cassava	Albizia (100%)	Durian and avocado (85.71%) Avocado (7.14%) Cacao (7.14%)	Small gully plug (1) Small check dam (1)	Labour Manure

Participatory management plans for field partner demonstration plots in Wonokeling, Wonorejo and Bubakan



# CONTROLLING GULLY EROSION USING SIMPLE MITIGATION TECHNIQUES

Farmers knew their land was eroding, especially on sloping lands. The preliminary survey found that all three villages suffered from heavy soil loss (on average 143 tonnes/ha/year). Gully erosion is detrimental to the community as it causes an increasing amount of sediment to be washed downstream and reduces agricultural productivity. However, this problem is often overlooked because it tends to occur at the boundary of farmlands and no one accepts responsibility. There is also a lack of knowledge of mitigation techniques.

To demonstrate how to control gully erosion, the project built 35 erosion mitigation structures, ranging from small check dams, gully plugs and a head structure made of cemented stones, gabions and bamboo.



*Bamboo gully plugs to prevent erosion and sedimentation, and to control gully development. Photo credit: WMTC*



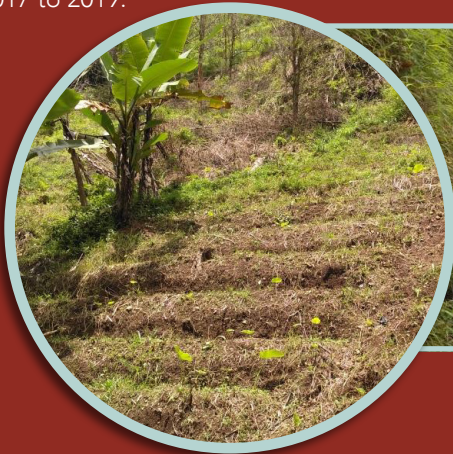
*Demonstrating the use of bamboo to control gully erosion. Photo credit: WMTC*

*“Bamboo gully techniques can be disseminated to other communities because the technique is easy to imitate, and the material is easy to obtain at a low cost.”*

— Dr Nining Wahyuningrum  
WMTC soil and water conservation expert

# CONSERVATION FARMING PLAYS DUAL ROLES TO IMPROVE LIVELIHOODS AND CONSERVE WATER AND SOIL

The project encouraged local households to practice conservation agriculture to mitigate soil erosion and sustainably improve livelihoods. The added value of timber, vegetable and fruit crops through agroforestry was immediate. Revenue from timber sales increased from 22.8 to 25.3 percent from 2017 to 2019.



*Demonstration agroforestry plots in Wonorejo village before (left) and after planting (right). Photo credit: WMTC*

*"I am happy to use agroforestry on my land when my family has more land and less labour. It allows me to reduce the labour input and gain more income from wood and fruit crops in the coming future. The project provided me with seedlings, fertilizers and technical support and, most importantly, through the project I also realized that this model benefits the environment of our homeland."*

— Mr Sadiko, Bubakan village field partner



*Feedback interview with field partner Mr Sadiko, Bubakan village. Photo credit: Ms Chuyu Hu, APFNet*

One of the project's most important contribution is building capacity of local communities to rehabilitate land and use sustainable conservation farming techniques. The project organized community training for farmers on how to use organic fertilizers, make organic pesticides, and build small bamboo gully plugs. Project partners also visited farm groups who developed integrated farming that combines agriculture, forestry, livestock, and culinary tourism. Through these activities, farmers learned how to diversify agricultural outputs and add value through post-harvest processing.




## STEP 5: MONITORING AND EVALUATION

Monitoring and reporting of the watershed's key indicators during the project was conducted within the scale of the overarching micro-catchment, smaller sub-areas, and on household level. The monitoring and evaluation data was obtained through three activities: (1) water yield and sedimentation monitoring, (2) site analysis, and (3) evaluation of economic and community activities on land management. For water yield and sedimentation monitoring, a variety of data was collected, ranging from the amount of rainfall, the river flow discharge, total runoff, to sediment yield. Information collected for land evaluation was slope degree, soil type, land cover, and the height and diameter growth of albizia. Data for economic and community activities on land management were collected based on the attendance rate of group meetings, as well as interviews with and surveys of local villagers on creating the participatory microcatchment management plan and their the understanding of project objectives. Data in this step was collected before the project activities started as baseline data and data after the project activities to monitor and evaluate the impact of the micro catchment. The application of the integrated participatory management in this microcatchment has made it easier to monitor and measure the hydrological response continuously, and facilitate observation of socioeconomic and institutional changes.



# CONCLUSIONS

The project has successfully increased people's incomes and their environment through using soil and water conservation technology and diversification of farm commodities. What are the specific impacts?

-  **Influenced community perceptions about the importance of sustainable land management.** Through their involvement in preparation, planning and implementation of conservation farming and agroforestry practices, the community recognizes the value of soil and water conservation efforts. The success of the project helped them understand how sustainable watershed management can improve land productivity, boost local livelihoods, and reduce soil erosion at the same time.
-  **Developed a participatory watershed management plan that involves all stakeholders from the local to the national level.** The project brought together village administration, district agencies and central government early in the planning process using focus group discussions. Stakeholders were committed to implementing the participatory management plan through an agreement which outlines the duties and responsibilities of relevant institutions. Project sustainability was also ensured by their support after completion of the project.
-  **Demonstrated the shift from seasonal crop farming to agroforestry.** Instead of growing a single commodity in one planting season and location, field partners now apply agroforestry practices, integrating perennial trees, seasonal crops, fruit trees, understory herbs and livestock. After the project was completed, farmers continued these practices and are now planning to expand the types of perennial tree species from albizia to limpaga and jabon, according to available market information.

# LESSONS LEARNED



Active participation and organization of land users are essential factors for success.



Micro-watershed management needs coordination, integration and synergies between stakeholders at each stage of planning, implementation and monitoring and evaluation.



Farmers are most interested in activities that improve farm-level production.



Education of farmers and formal agricultural extension services are crucial.



Monitoring planting activities in the field is necessary.



Training of farmers on maintenance of activities is needed.

The project was completed in 2019, but the impacts of sustainable watershed management will continue in the long term. This demonstration project will inspire more farmers to apply agroforestry practices and soil and water conservation techniques. Most importantly, only when the benefits are felt by the whole community through increased livelihoods, can the project be judged successful as well as sustainable.





For project details please refer to:  
<https://www.apfnet.cn/plus/view.php?aid=4326>

The Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet) is a non-profit international organization dedicated to advancing sustainable forest management and rehabilitation in the Asia-Pacific region.

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