

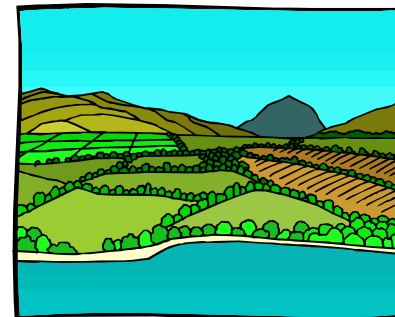


Department of Agriculture  
BUREAU OF SOILS AND WATER MAN-

# PRIMER ON Water Resources Management Technologies

A Production undertaking by the  
**Training and Information Dissemination Services**  
**Bureau of Soils and Water Management**  
Elliptical Road, Corner Visayas Avenue,  
Diliman, Quezon City

2002



## RATIONALE

Water resources management is most valuable in helping address the most limiting production factor to irrigate among other farm resource endowments such as land, labor and capital.

An accelerated development of water resources management technologies and provision of infrastructure provide an opportunity to increase cropping intensity and production.

## ACTIVITIES

1. Water resources management infrastructure development was expanded and intensified with the construction of new and rehabilitation of existing national systems. Likewise, the repair, management and maintenance of these facilities devolved to the Local Government Units (LGUs) or Irrigator's Associations shall be defined and pursued to sustain their operation.

The order of priority in implementing these projects are:

- a) Rehabilitation of existing irrigation facilities;
- b) Completion of on-going projects; and
- c) Construction of new facilities.



2. As supplementary to large systems, shallow aquifer was tapped through the establishment of shallow tube wells (STWs). Priority for STWs were given to areas located at the tail-end of National Irrigation Systems, where water delivery is inadequate to support the requirement of the rice crop, and lowland rainfed areas adopting the "dry-seeded technology."

Local well-drillers were supported with a credit financing scheme so they could fabricate drilling pipes. To improve the technical capabilities of local well-drillers in the installation of STWs, the following were undertaken:

- a) Research and Development (R & D) in aquifer

characterization to optimize the utilization of aquifer resources;

- b) Development of design criteria for location specific STW irrigation system; and
  - c) Improved well drilling technology.
3. Small Water Impounding Projects (SWIPs) were continuously constructed by the BSWM and RFUs in coordination with the National Irrigation Administration and the Local Government Units (LGUs).
  4. Small Farm Reservoirs (SFRs) were established by the RFUs and BSWM in coordination with the LGUs in areas where large scale irrigation and STW systems are not feasible.
  5. Pressurized Irrigation Systems were also developed in areas where other facilities are not applicable.
  6. The BSWM continues its Cloudseeding Operations to prevent adverse effects of prolonged dry spells over major reservoirs and main agricultural areas.


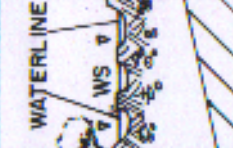

## SMALL WATER IMPOUNDING PROJECT



*What is a Small Water Impounding Project or SWIP?*

A SWIP is an earth dam structure built across a narrow depression or valley to harvest and store rainfall and run-off for multiple uses. It has a maximum height of 30 meters.

## WATER RESOURCES MANAGEMENT TECHNOLOGIES FOR VARIOUS LANDSCAPES

FARM LOCATION	U P L A N D		L O W L A N D	
	Footslopes of Hills Mountains (Mixed Slopes)	Sloping Lands (8-18%)	Undulating Lowland (3-8% slopes)	Rivers / Creeks
Appropriate rainwater / water saving technologies. (Small Scale Irrigation System).	Small Water Impounding Project (SWIP)	Rain Interceptor Ponds and Ditches (RID)	Small Farm Reservoir (SFR)	Diversion Dam (DD)
	Cross section of cultivated landscape			
				No Shallow Groundwater
				Shallow Tubewell (STW)
				Dug-out Pond (DOP)
				Open Ditch (OD)
				DRILLED WELLS
				WATERLINE
				AQUIFER

*What are the uses and benefits of SWIP?*

- Ensure crop intensification and diversification
- Ensure improved farm income
- Minimize soil erosion and nutrient losses and prevent flooding of low-lying areas
- Local recreation site and area for soil and water technology researches
- Recharge groundwater

*Who are the beneficiaries of SWIP?*

Priority beneficiaries are:

- Organized farmers association
- Areas with no "rights of way" and other social problems
- Capable and willing to shoulder full cost of operations and maintenance

*How to avail assistance and support for SWIP.*

Through written requests or resolutions.

*Mode of implementation:*

Through a Memorandum of Agreement (MOA) with LGUs that are:

- Technically capable
- With minimum equipment and other resource requirements
- Willing to provide counterpart funds of at least 20% of the total project cost

### SMALL FARM RESERVOIR

*What is a Small Farm Reservoir or SFR?*

A *Small Farm Reservoir* is a water impounding structure with a maximum height of embankment of 4m and average pond

area of 1,500 square meters. It serves limited areas no more than 2 hectares and is designed to become an integral part of individual rainfed farms with catchment area not exceeding 10 hectares.



*What are the uses and benefits of SFRs?*

- Ensure crop intensification and diversification
- Ensure improved farm income
- Recharge groundwater
- Minimize soil erosion and nutrient losses

*What are the advantages of SFRs?*

- Less capital intensive
- Easy to construct and maintain
- Empower farmer cooperation and production capability

*What are the target beneficiaries of SFRs?*

- Individual farmers with no tenurial problem
- Willing to shoulder part of construction cost in excess of P10,000 subsidy from DA-BSWM
- Willing to shoulder full cost of operation and maintenance
- Willing to adopt appropriate production technologies

*How to avail assistance and support for SFRs.*

Through written requests or resolutions.

*Mode of Implementation*

Through a Memorandum of Agreement (MOA) with LGUs

that are:

- Supportive of soil and water conservation technology
- Willing to shoulder part or 10% of implementation cost
- Willing to provide assistance and support to the beneficiaries

*Scheme of Implementation*

At least 10 units of SFRs per cluster are recommended to attract bulldozer owners and create impact areas.

## **DIVERSION DAM**

*What is a Diversion Dam or DD?*

A *Diversion Dam* is a concrete or rockfill structure constructed across a channel of streams, creeks and small rivers of continuous and dependable flow to raise the water level. It allows diversion of water by gravity from the source to the adjoining farmlands.

*What are the uses and benefits of DD?*

- Ensure crop intensification and diversification
- Ensure improved farm income

*Who are the target beneficiaries of DDs?*

DDs are implemented to serve farmers who are cultivating areas adjacent to small rivers or live creeks.

*How to avail assistance and support for DD.*

Through written requests or resolutions

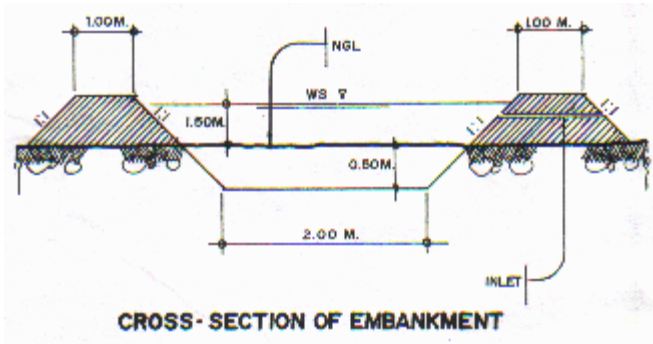
*Mode of Implementation*

Through a MOA with LGUs that are:

- Technically capable
- With minimum equipment and other resources requirements

- Willing to provide counterpart funds of at least 20% of the total project cost.

### DUG-OUT POND



*What is a Dug-Out Pond or DOP?*

A *Dug-Out Pond* is most suited to nearly level or flat areas. A reservoir is constructed by excavating the earth leaving a storage space that can be filled with water from rainfall and run-off. Water can be stored at higher level than the service area where obstruction of water can be done through a siphon or by placing PVC pipes (1" - 2" dia.) at the embankment to allow discharge by gravity. When water stored reach below ground level, pumping is required to draw out water. The maximum height of embankment is 3m.

*What are the uses and benefits of DOP?*

- Ensure crop intensification and diversification
- Ensure improved farm income
- Recharge groundwater

*Who are the target beneficiaries of DOP?*

DOPs are recommended for individual farmers in flat areas where other irrigation systems are not economically and technically feasible.

*How to avail assistance and support for DOP.*

The priority beneficiaries are:

- Individual farmers with no tenurial problem
- Willing to shoulder part of construction cost in excess of P10,000 which is equivalent to 400 cu.m.
- Willing to shoulder full cost of O & M

*Mode of Implementation*

Through a MOA with LGUs that are:

- Supportive of soil and water conservation technology
- Willing to shoulder part of 10% of implementation cost

*Scheme of Implementation*

- At least 10 units per cluster
- Through a bulldozer or manually

### OPEN DITCH



*What is an Open Ditch or OP?*

An *Open Ditch* is a system of earth canal established across flatlands with no shallow groundwater. It collects or harvests rainwater during rainy season for storage in the subsoils which is consequently used for dry season crops.

Its depth of excavation must not go beyond the permeable layer. A 0.5 x 1.0m ditch is recommended.

*What are the uses and benefits of OD?*

- Ensure crop intensification and

- diversification
- Ensure improved farm income
- Recharge groundwater

*Who are the beneficiaries of OD?*

The farmers who will largely benefit from OD are those cultivating the flat areas who are confronted with drainage or waterlogging problems and where STW cannot be used for lack of groundwater.

*How to avail assistance and support for OD.*

Priority beneficiaries are:

- Organized farmers association in a contiguous area
- Areas with no "right of way" or tenurial problem
- Willing to shoulder full cost of operation and maintenance
- Willing to adopt appropriate production technology

*Implementation Scheme*

- Through the use of backhoe or manually
- Individual farms

*Mode of Implementation*

Through a MOA with LGUs that are:

- Supportive of soil and water conservation technology
- Willing to shoulder part or

## SHALLOW TUBE WELL

*What is a Shallow Tube Well or STW?*

A *Shallow Tube Well* is an effective water resources management technology in level areas with dependable shallow groundwater. This consists of one or more fully developed shallow tubewells equipped with appropriate pumping units that can serve a contiguous area cultivated by



an individual farmer or groups of farmer. Its pumping unit consist of a centrifugal pump powered by a 5-10 diesel engine or electric motor.

An STW is a tube or pipe vertically set into the ground at depth of 20 to 60 feet for the purpose of suction lifting of water from shallow aquifers. The tube or pipe is usually is a 3" to 4" diameter schedule 40 G.I. Pipe.

*What are the advantages of STW?*

- Low investment cost (P6,000 to 12,000 per hectare of service area)
- High water source efficiency
- Simple to operate
- Short gestation period (2-3 weeks)
- Sustainable development
- Empowerment of farmers

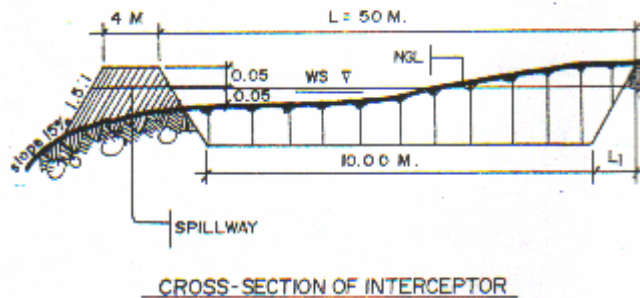
*Who are the beneficiaries of STW?*

- Members of organized farmers cooperative/association
- Willing to avail of the zero interest loan for pumping units
- Willing to pay the loan in equal bi-annual ammortization within 5 years
- Willing to shoulder full cost of operation and maintenance

*Mode of repayment*

- Payable in cash or in equivalent quantity of palay to the LGU to be transmitted to DA-RFU
- Payments after every harvesting

## RAIN INTERCEPTOR PONDS AND DITCHES



*What are Rain Interceptor Ponds and Ditches or RIDs?*

Rain Interceptor Ponds and ditches are soil and water conservation innovative technology designed to trap and store run-off and rainfall that cause soil erosion and consequently have adverse impacts to agriculture production. RIDs are established in sloping lands (8-18%) along the contour with a capacity that would allow minimum drain but maximum storage for crop utilization. Maximum height of RID embankment is 3.5 m, established every 50 m of the slope.

*What are the benefits of RIDs?*

- Ensure crop production and diversification
- Enhance productivity of marginal sloping lands
- Minimize soil erosion
- Conserve soil nutrients
- Serve as infiltration ponds for groundwater recharge

*Who are the beneficiaries of RIDs?*

- Organized farmer association in a contiguous area
- Areas with no "right of way" and other social problems
- Farmers who are willing to shoulder full cost of operation and maintenance

- Farmers who are willing to adopt recommended appropriate production technology

*How to avail assistance and support for RIDs.*

Through written requests or resolutions.

*Mode of Implementation*

Through a MOA with LGUs that are:

- Supportive of soil and water conservation technologies
- Willing to shoulder part or 10% of implementation cost
- Willing to provide sustained assistance and support to the beneficiaries