



Department of Agriculture

BUREAU OF SOILS AND WATER MANAGEMENT

State of the Art Irrigation Systems Technologies: The Philippine Experience and Challenges of Climate Change (Water Catchment, Impoundment and Distribution)

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Outline

- ▶ **Some facts on water**
- ▶ **Climate and threats of climate change**
- ▶ **Rainwater harvesting structures**
- ▶ **Alternative irrigation systems**

Facts on water consumption:

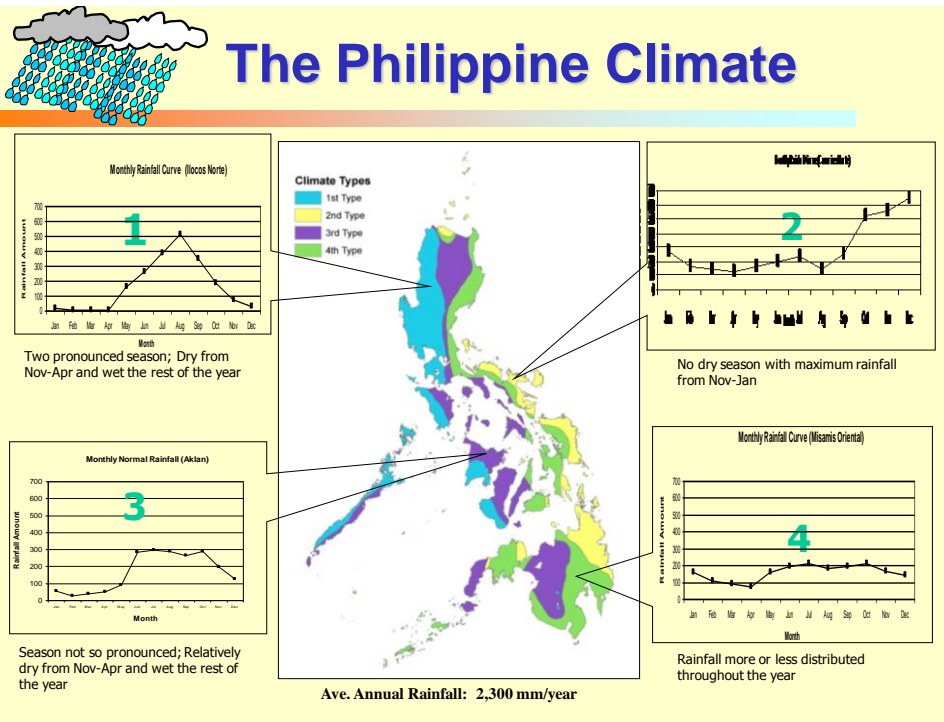
- ❑ Globally, water requirements to feed the world in **2050** would have to increase by another **~4500 km³/yr** from the current **~7000 km³/yr**
- ❑ Humans are expected to consume **40% more** water in the next **20 years**



- ❑ Currently, **1/3** of the world's population live in countries that experience medium to high water stress. The ratio is expected to grow to **2/3 by 2025**



Water is life...



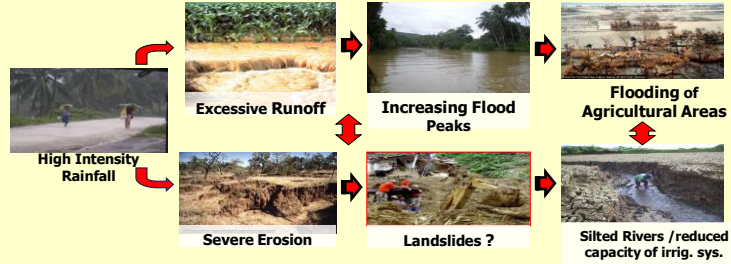
Threats of Climate Change.....

- Altered rainfall distribution (**Changing rainfall pattern**)
- Increased temperature (**High evaporative demand**)
- Extreme climate events ("**Too much and too little water**")
- Unstable/unsteady water availability (**reduced (dry season) and excessive (wet season) flows**)

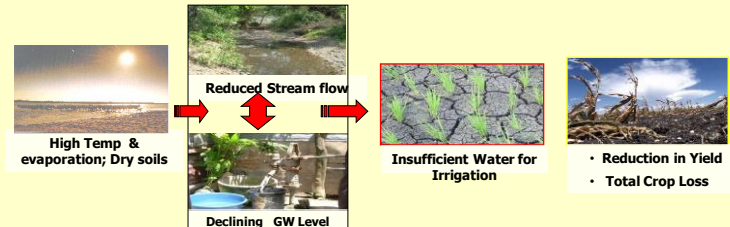


Scenarios already happening.....

⇒ During Rainy Season, WATER IS TOO MUCH!



⇒ During Dry Season, WATER IS TOO LITTLE!



Water Resources Potentials (MCM/year)

Water Resources Region	Groundwater	Surface Water @ 80% Dependability	Total Potential	Water Demand in 2025	Estimated available water in 2025
I	1,248	3,250	4,498	3,041	1,457
II	2,825	8,510	11,335	12,466	-1,131
III	1,721	7,890	9,611	18,168	-8,557
IV	1,410	6,370	7,780	10,052	-2,272
V	1,085	3,060	4,145	4,167	-22
VI	1,144	14,200	15,341	7,595	7,749
VII	879	2,060	2,939	2,729	210
VIII	2,557	9,350	11,907	1,956	9,951
IX	1,082	12,100	13,182	4,598	8,584
X	2,116	29,000	31,116	3,682	27,434
XI	2,375	11,300	13,675	4,141	9,534
XII	1,758	18,700	20,458	12,806	7,652
TOTAL	20,200	125,790	145,990	85,401	60,586

Source: Master Plan for Water Resources Development in the Philippines, JICA-NWRB, 1998

Water catchment/impoundment implemented by Bureau of Soils and Water Management – an adaptation strategy to minimize impact of climate change

Rainwater harvesting structures

- The BSWM, as part of its mandate, promotes rainwater harvesting through small water impounding projects(SWIP) and small farm reservoirs(SFR)



SFR



SWIP

Small Water Impounding Projects (SWIP)

- an earthfill structure that collects and stores rainfall and runoff during the rainy season for productive use during the dry season.



Maasin SWIP, Talugtog, Nueva Ecija

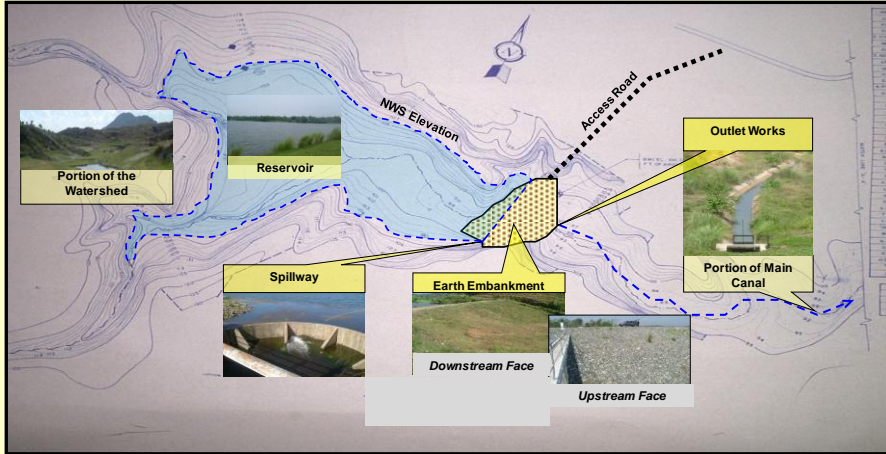
Small Water Impounding Project (SWIP)

- *a water harvesting and storage structure for soil and water conservation, flood control, supplemental irrigation, inland fishery and recreation*
- *Height : 5 -15 meters*
- *average service area is 50 ha per project (30-150 ha)*
- *average investment cost is P 250,000.00/ha (P 250,000-300,000)*

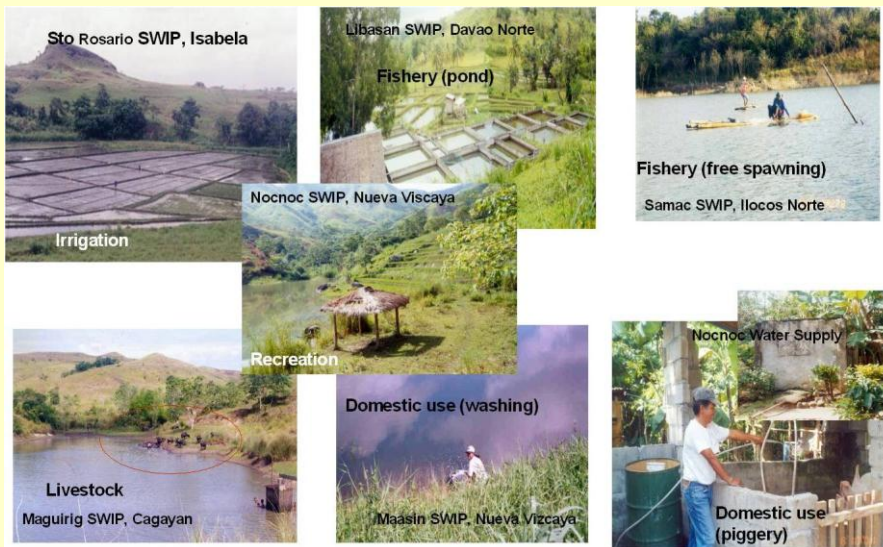


Project Description...

TYPE OF STRUCTURE : MODIFIED HOMOGENOUS EARTHFILL EMBANKMENT
STRUCTURAL HEIGHT : 10 – 15 meters
AVE. STORAGE CAP. : 0.407 MCM (0.15 MCM – 1.50 MCM)



The Project has multi-uses...



Success stories.....

Libasan SWIP, Nabunturan, ComVal



Crop Production



Strong Farmers Participation



Fish Hatchery and Inland Fishery



Seedlings Dispersal for Watershed Management

- Strong Farmers Association – Libasan Multi-purpose Cooperative
- Strong LGU support and assistance and linkages with national agencies as they adopt cost sharing scheme
- Continuous upgrading skills of farmers (Capacity Building)

Small Farm Reservoir (SFR)

- ❑ *smaller version of SWIP designed to collect rainfall and run-off for use in a single farm*
- ❑
- ❑ *height: ≤ 4 meters with reservoir area of 300 – 1,500 sq. m.*
- ❑ *Individually-managed with service area of 0.5- 1.00 ha*
- ❑ *investment cost/ha – P40,000 to P80,000*



Success stories.....

125 SFRs, Bingawan, Iloilo



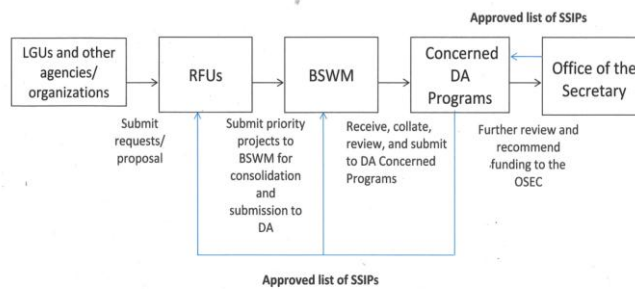
(Good Governance & Optimization of Limited Resources)

- save crop during unexpected prolong drought
- promote diversified farming system (e.g. rice and vegetable production, duck raising and inland fish production)
- strengthen partnership between and among national agencies, LGUs, CSOs and farmers

Source: Mayor Palabrica's SFR Presentation, 2010

Project Implementation

Annex 1. SMALL-SCALE IRRIGATION PROGRAM PROCESS FLOW



Accomplishment as of CY 2013

Rainwater harvesting structures	Number of completed projects	Service Areas (ha)	Number of Farmer-Beneficiaries
Small Water Impounding Project	551	21,194	18,095
Small Farm Reservoir	23,251	23,251	23,251

Alternative Irrigation System (AIS)

- An irrigation system utilizing the renewable energy source

- Ram Pump Irrigation System**
- Solar Irrigation System**
- Wind Pump Irrigation System**

Ram Pump Irrigation System

- An old technology already exists already more than 200 years ago
- The ram has mechanism which utilizes the energy contained in free flowing water
- The principle of ram is conversion of velocity to pressure



Advantages & disadvantages of Ram Pump

Advantages	Disadvantages
<ol style="list-style-type: none"> 1. Pumps 24 hours per day automatically 2. Can pump to very high elevations 3. Doesn't consume fuel or electricity 4. Doesn't pollute (no CO₂) 5. Spare parts locally available 	<p>Can only pump 3-35% of the water up which passes through its pump body</p>

Brgy. Tibal-og, Sto. Tomas, Davao del Norte

Installation of ram pump

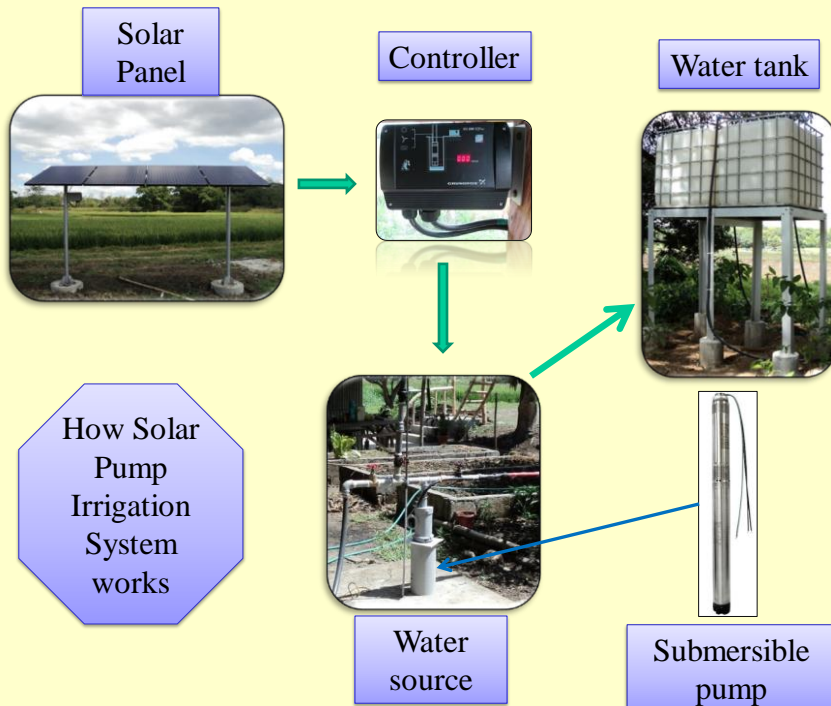


Construction of ferro-cement reservoir



Solar Pump Irrigation System

- ❑ pumping facility driven by solar energy which consists of a solar panel, controller and a pump
- ❑ It is used to pump water for irrigation, watering livestock, domestic water supply
- ❑ Can be suitable water supply for agriculture in remote areas



Advantages & disadvantages of Solar Pump

Advantages	Disadvantages
<ol style="list-style-type: none"> 1. Utilize solar energy source 2. Doesn't consume fuel or electricity 3. Can be easily installed even in the far-flung areas 4. Spare parts locally available 	<ol style="list-style-type: none"> 1. High investment cost 2. Operate only during daytime with sunlight



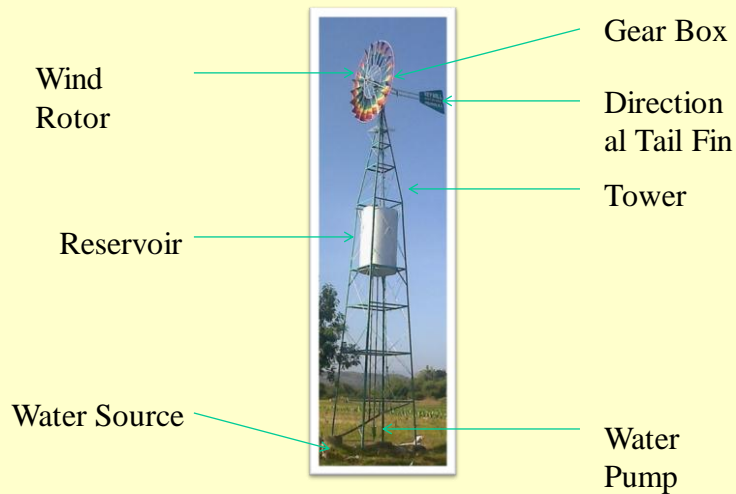
Brgy. Buhangin, Sta.
Maria, Bulacan
Region III

Wind Pump Irrigation System

- ❑ Started since 9th century an irrigation system that converts kinetic energy from the wind into mechanical energy
- ❑ It is used to pump water from ground water source for irrigating crops, domestic water supply, and landscape areas
- ❑ Drinking and cleaning facilities for poultry and livestock



PARTS AND FUNCTION



Advantages & disadvantages of Wind Pump

Advantages	Disadvantages
1. Renewable energy source using wind power	1. Suitable only to shallow ground water source
2. Pump can operate in 24 hours depending on the wind speed	2. Difficult to install in remote areas due to heavy part that needs to be transported
3. Doesn't consume fuel and electricity	3. Needs regular maintenance of the moving parts
4. Spare parts locally available	



Installed Wind Pump
Brgy. Bobon, Burgos, Ilocos Norte

Accomplishment as of CY 2013

Alternative Irrigation System	Number of completed projects
Ram Pump Irrigation System	43
Solar Pump Irrigation System	23
Wind Pump Irrigation System	17

“God must think we’re crazy. We just let the rain falls off our roofs onto our soil, it washes the soil away and flows to the bottom of the hill. Later, we then go down the hill and carry it back uphill to drink.” – An African Laborer.

(Source: <http://greatergood.i.ph/blogs/greatergood/?p=109>)

End of Presentation