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Dialogues on Resilient Infrastructure

Drought Resilience

Irrigation, water harvesting, drainage

Jelle Beekma, 24 March 2021



Infrastructure for Drought Resilience

1. Irrigation;

- i. Increased drought resilience (e.g. protective irrigation);
- ii. do we strive for maximum water productivity versus yield;

2. Water harvesting/watershed management

- i. Additional water retention;
- ii. Reduced extremes;

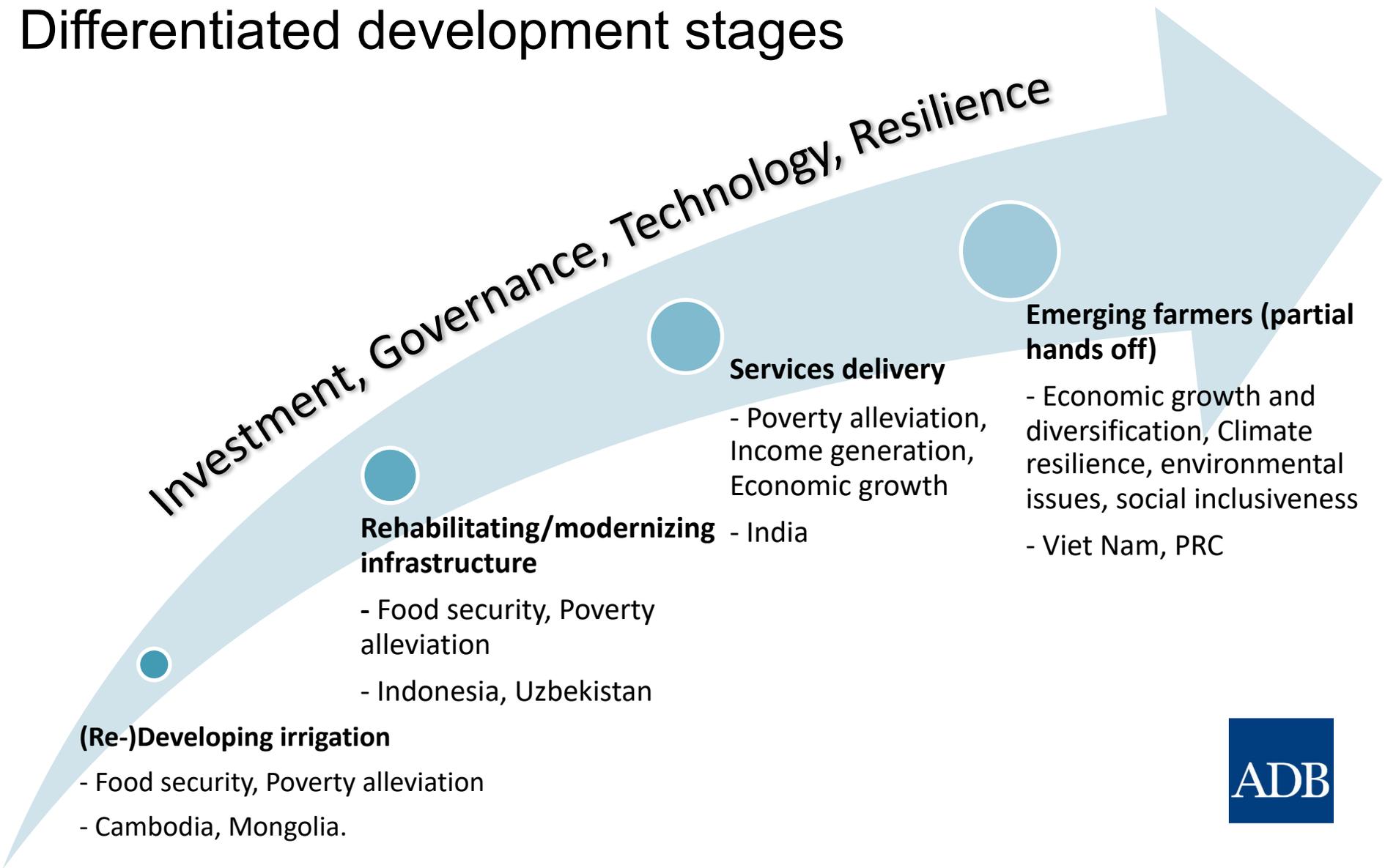
3. But also, drainage

- i. High efficiency and productivity may result in salt accumulation, this requires leaching;
- ii. If leaching exceeds the natural drainage, artificial drainage is needed.

Development stages

Differentiated development stages

Investment, Governance, Technology, Resilience



Rehabilitating/modernizing infrastructure

- Food security, Poverty alleviation
- Indonesia, Uzbekistan

(Re-)Developing irrigation

- Food security, Poverty alleviation
- Cambodia, Mongolia.

Services delivery

- Poverty alleviation, Income generation, Economic growth

Emerging farmers (partial hands off)

- Economic growth and diversification, Climate resilience, environmental issues, social inclusiveness
- Viet Nam, PRC

Viet Nam 49404-002: Water Efficiency Improvement in Drought-Affected Provinces Project



Current standard irrigation practice for growing pepper in Binh Thuan Province



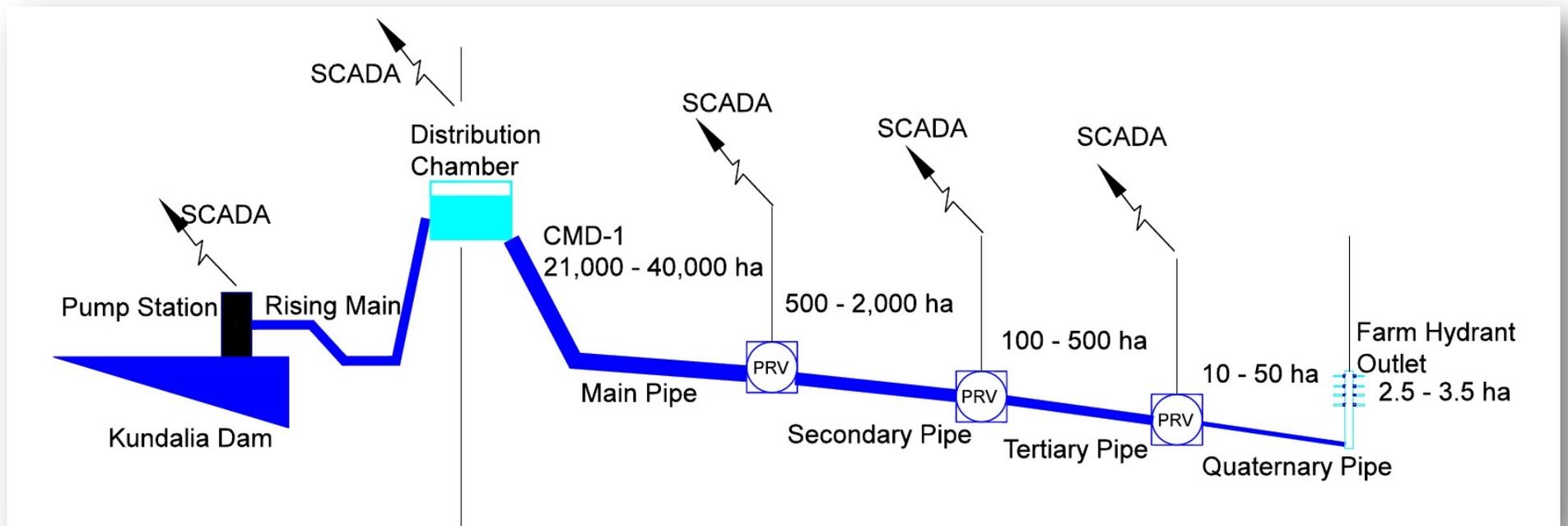
Sprinkler irrigation of pepper using PVC pipe in Binh Thuan Province



Mango growing area converted from rice fields in Khan Hoa Province

Large scale pressurized precision irrigation

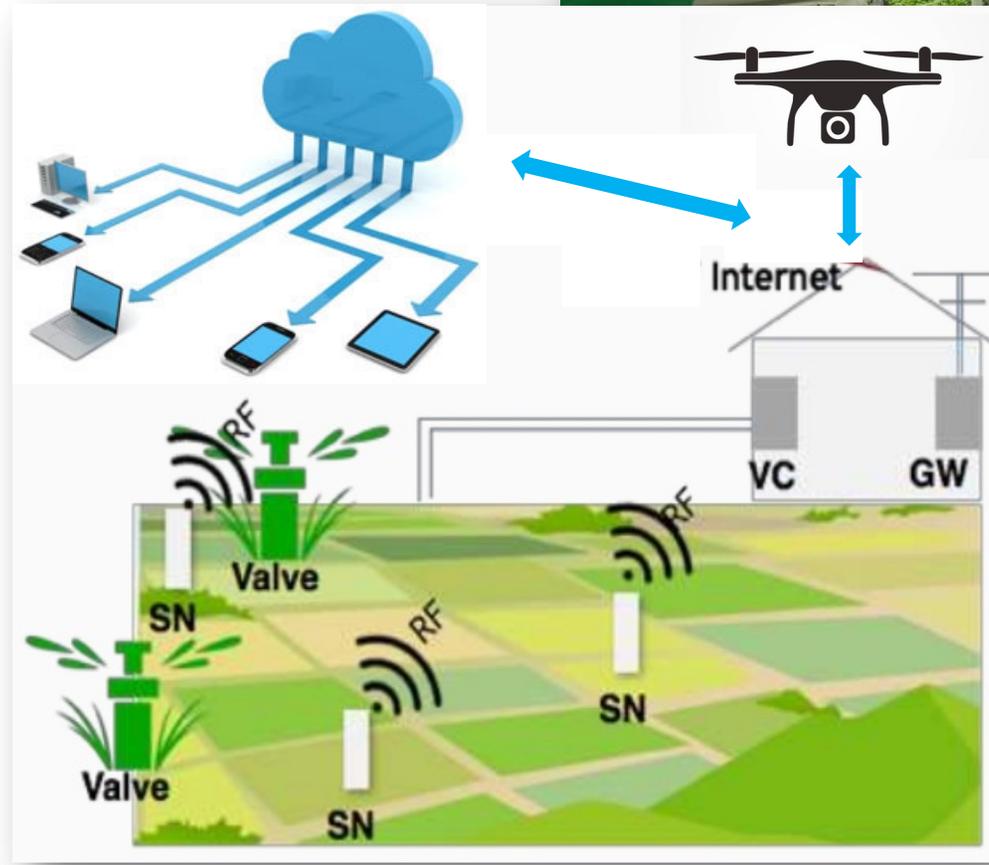
India 45371-007: Madhya Pradesh Irrigation Efficiency Improvement Project



Smart infrastructure

Urban farming

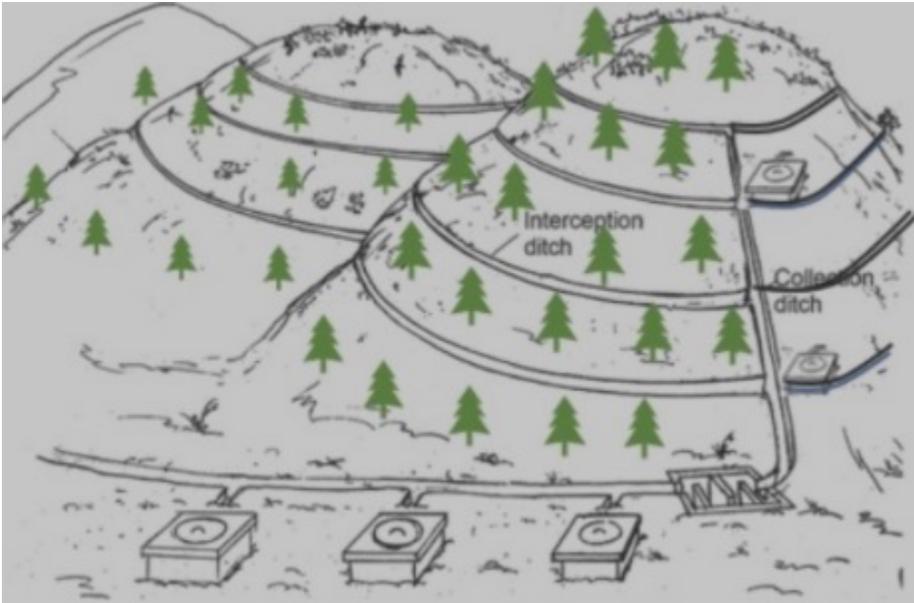
Intelligent irrigation system



Water harvesting/watersheds

- Terraces;
- Tanks;
- Check dams;
- Vegetation strips;
- Caption and leading to fields.

PRC Henan Xichuan Integrated Ecological Protection and Environmental Improvement Project - (53042-001)



Drip Irrigation Area

Flood Irrigation Area

No Irrigation Area



Drainage for salinity control

Drain flow resulting from different irrigation methods.

Irrigation ↓ 100%



Surface Irrigation

↓ 100%



Sprinkler Irrigation

↓ 100%



Drip Irrigation

Drain Flow
Contains salt ↓ 40%-50%
+ residues

↓ 10%- 20%

↓ 0%-10%

If drain flow less than 10-20%, in arid regions extra irrigation required for leaching of salts to avoid salt accumulation.

Drainage for salinity control

- Natural drainage on permeable soils with deep drainage base;
- Surface drainage system (collapsing);
- Vertical drainage;
- Horizontal drainage;
- Composite systems.

Additional to infrastructure

1. Enabling environment and policies;
2. Governance;
3. Management, particularly maintenance;
4. Value chain and marketing.