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PhD Seminar
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Subsurface drainage practices in irrigated agriculture in semi-arid and arid regions

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Mission

To lead development and provision of knowledge, tools, and measures for supporting the sustainable management of land and water resources without compromising the sustainability of vital ecosystems and human communities

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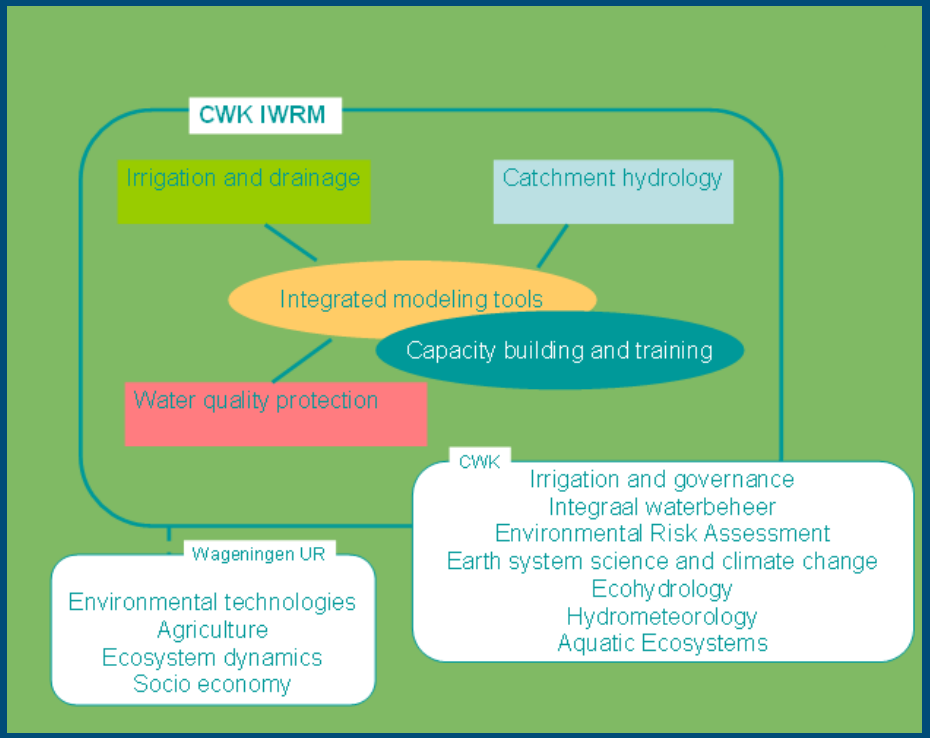
Our core expertise

- Catchment hydrology
- Irrigation and drainage
- Water quality
- Integrated modeling
- Supporting water governance



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Example: waterlogging and salinity in irrigated agriculture

Indicator	Unit	World	Egypt	India	Pakistan
Irrigated area	(Mha)	272	3.4	57.2	16.7
Drained Area	(Mha)	190	3.0	2.5	7.5
of which SSD	(Mha)		1.9	0.025	0.32
Salt-affected areas	**(Mha)**		**1.0**	**6.7**	**2.4**
of which waterlogged	**(Mha)**		**0.6**	**4.5**	**1.7**

ICID, 2003

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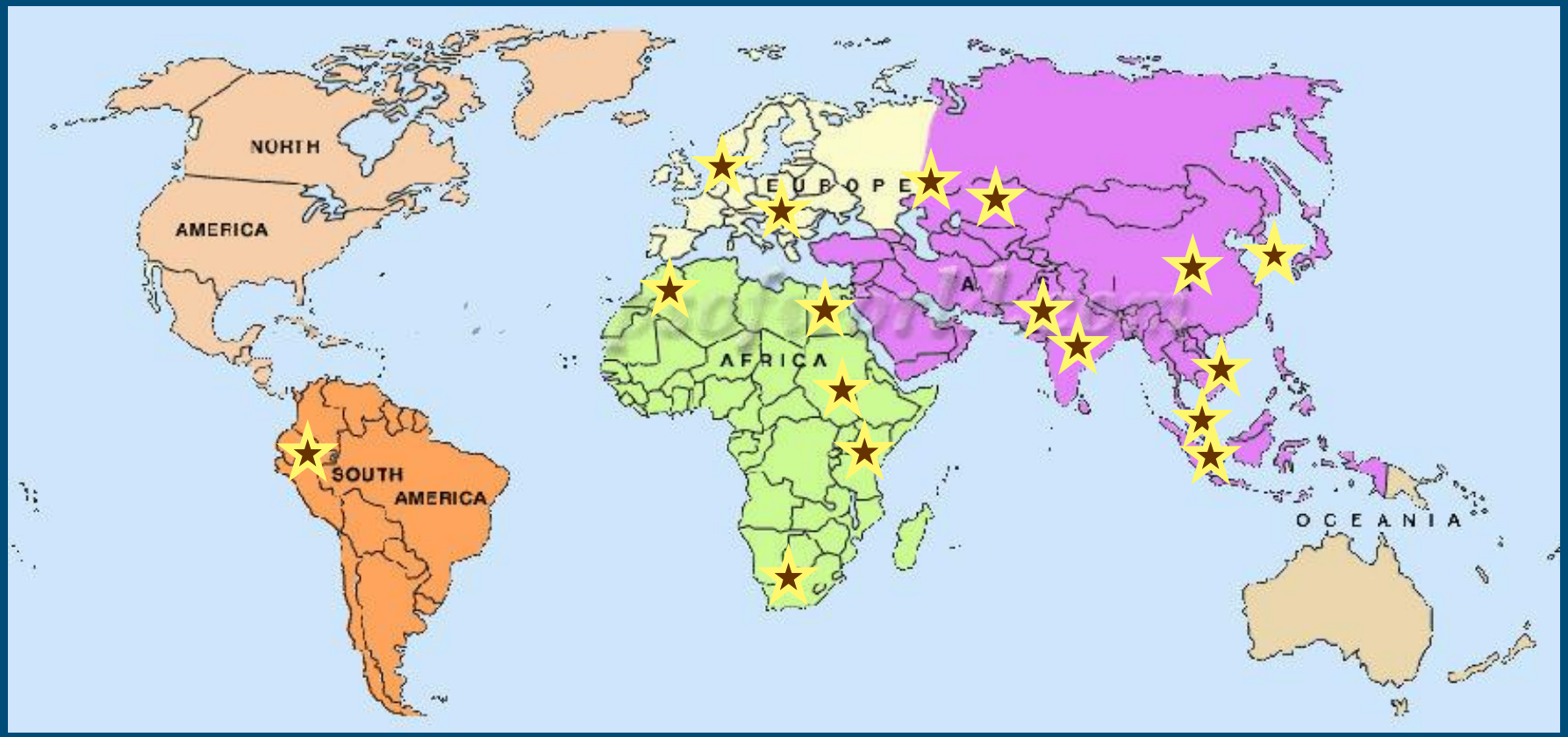
Countries where IWRM-team is active



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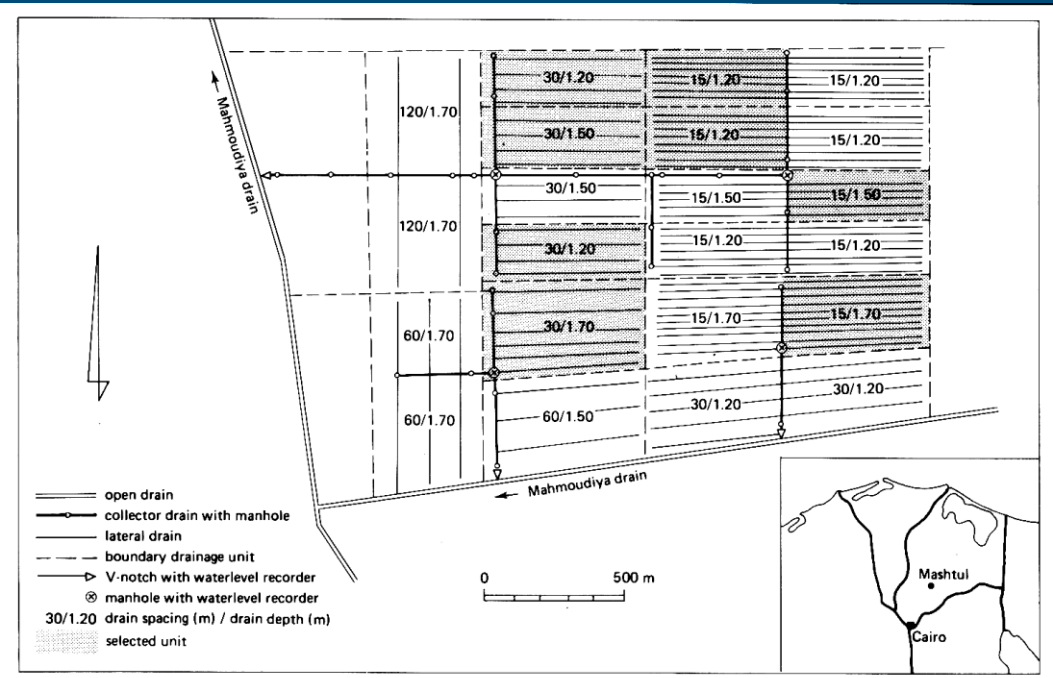
Case 1: Verification of design criteria in Egypt

- Mashtul Pilot area: 110 ha in south-east of Nile Delta
- 9-year monitoring programme in farmers' fields
- Crops: wheat, berseem, maize, cotton & rice
- Subsurface drainage with different drain depth - spacing combinations



Results:

- Depth of watertable: 0.80 m
- Drain discharge: 0.9 mm/d
- Optimum drain depth: 1.2 – 1.4 m
- For drain pipe capacity: field drains 1.2 mm/d, for collector drains 1.8 mm/d

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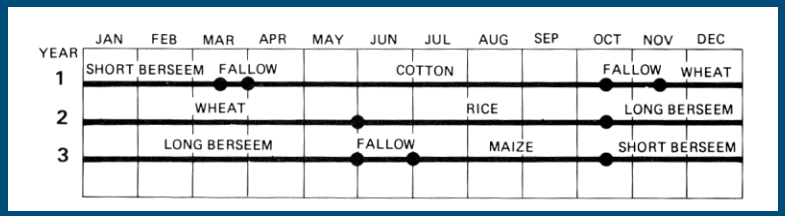
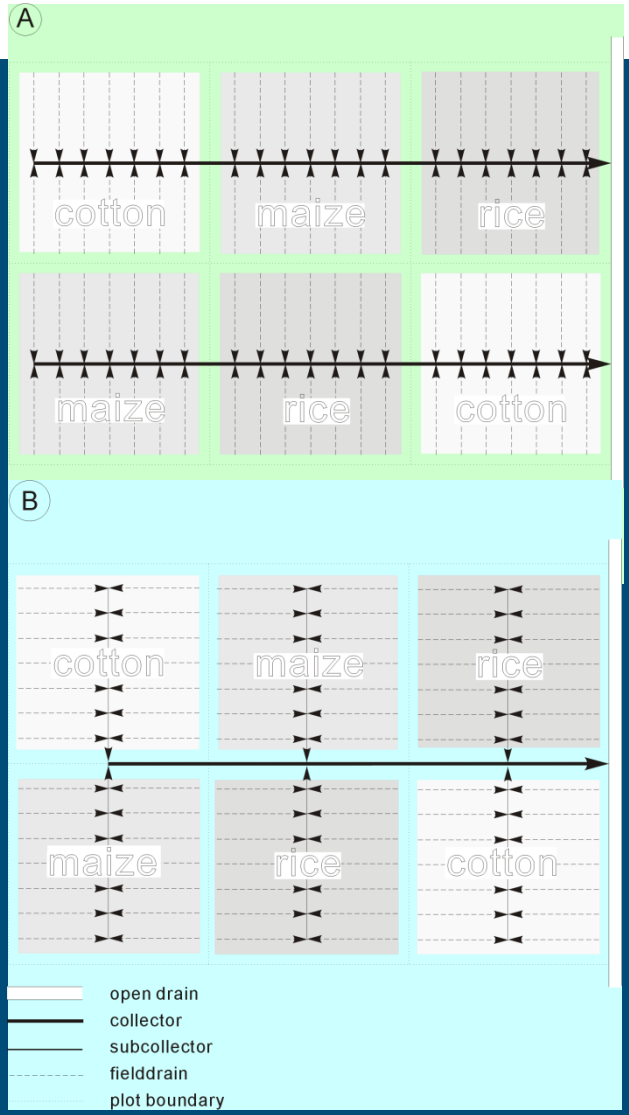
Safwat & Ritzema, 1990

Case 2: Modified layout for SSD in rice areas

- 5-year monitoring programme in experimental plots ➔ farmers' fields ➔ large-scale monitoring
- Objective to block drainage in rice plots
- Results: 25 % saving in irrigation gifts without any negative effects on crop yield and soil salinity





El Atfy, Abdel Alim and Ritzema, 1991

Case 3: SSD practices in Farmers' fields in India

- 5-year monitoring programme in 6 pilot areas, 1 experimental plot and 1 large-scale monitoring site in 5 agro-climatic regions to develop ssd strategies
- Drain spacing between 60 and 150 m
- Drain depth between 1.1 and 1.5 m
- Good economic returns
- Large-scale implementation hampered because (i) farmers have insufficient resources and (ii) poor institutional set-up ➔ policy reforms are needed

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Ritzema et al., 2008

Case 4: SSD implementation practices

- Installation practices in fifty years from purely manual to fully-mechanized
- New types of installation equipment: trenchless and trenchers
- New materials for pipes and envelopes
- New methods for quality control
- New organizational set-ups
- Capacity building

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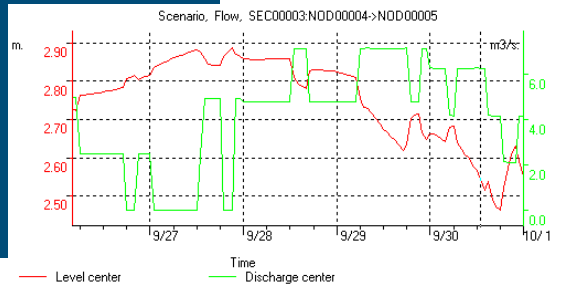
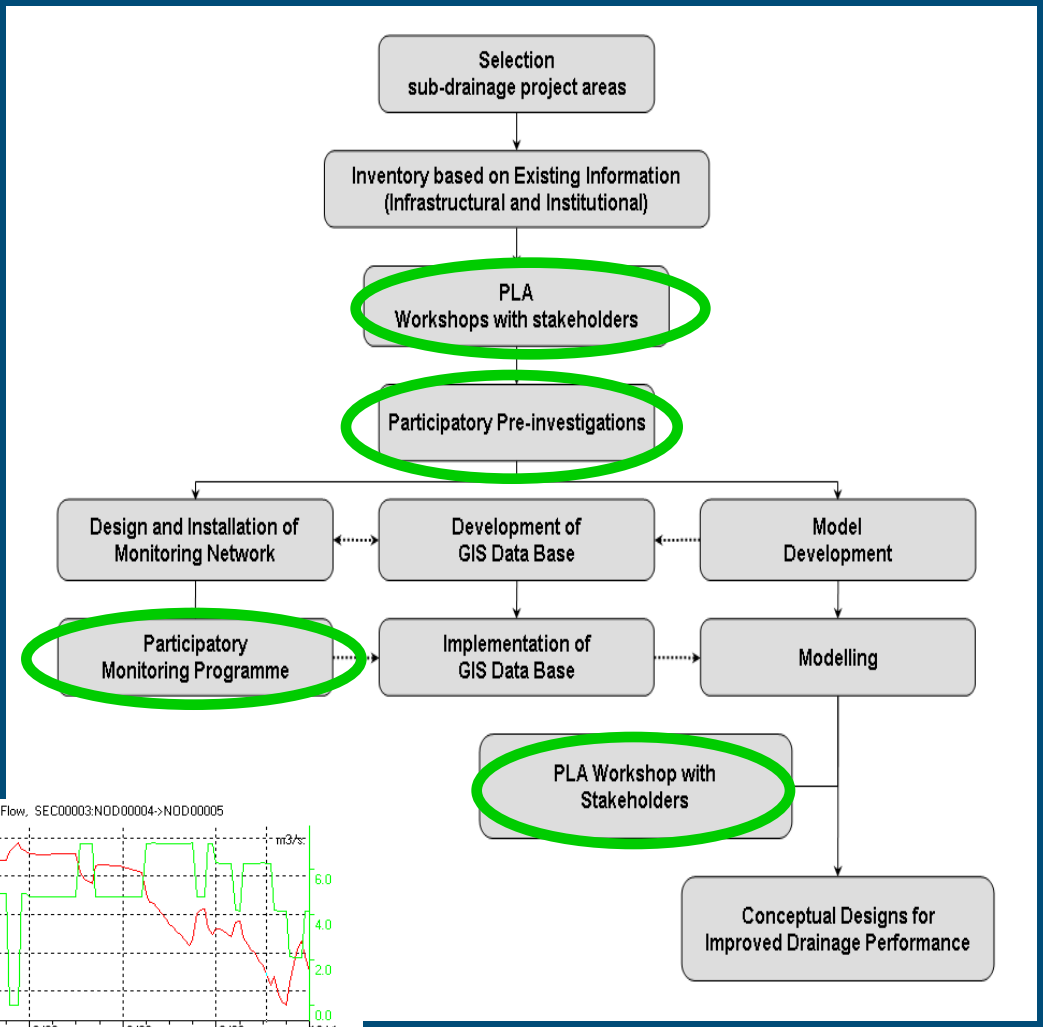
Ritzema et al., 2006

Case 5: Participatory drainage research

- Polders in Red River Delta
- Centuries-old dual irrigation and drainage systems
- Complex infrastructure: both physical and institutional
- Outcome: Conceptual design for improved drainage performance (both physical infrastructure as well as institutional) agreed upon by all stakeholders





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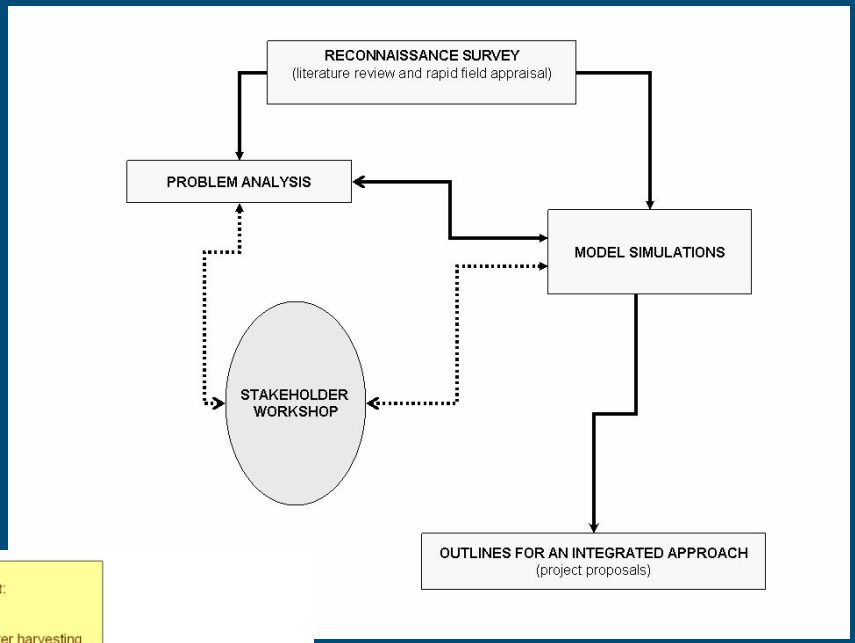
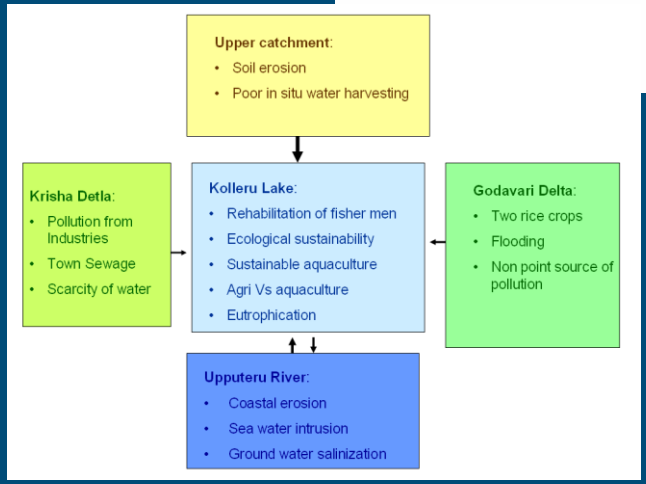
Ritzema et al., in press

Case 6: Modelling to increase stakeholder participation

- Study to develop an integrated approach for the Kolleru-Upputeru wetland in Andhra Pradesh, India
- Complex ecosystem with many stakeholders with conflicting interests
- Single-issue solutions do not work
- Lack o f data
- Using models to create common understanding





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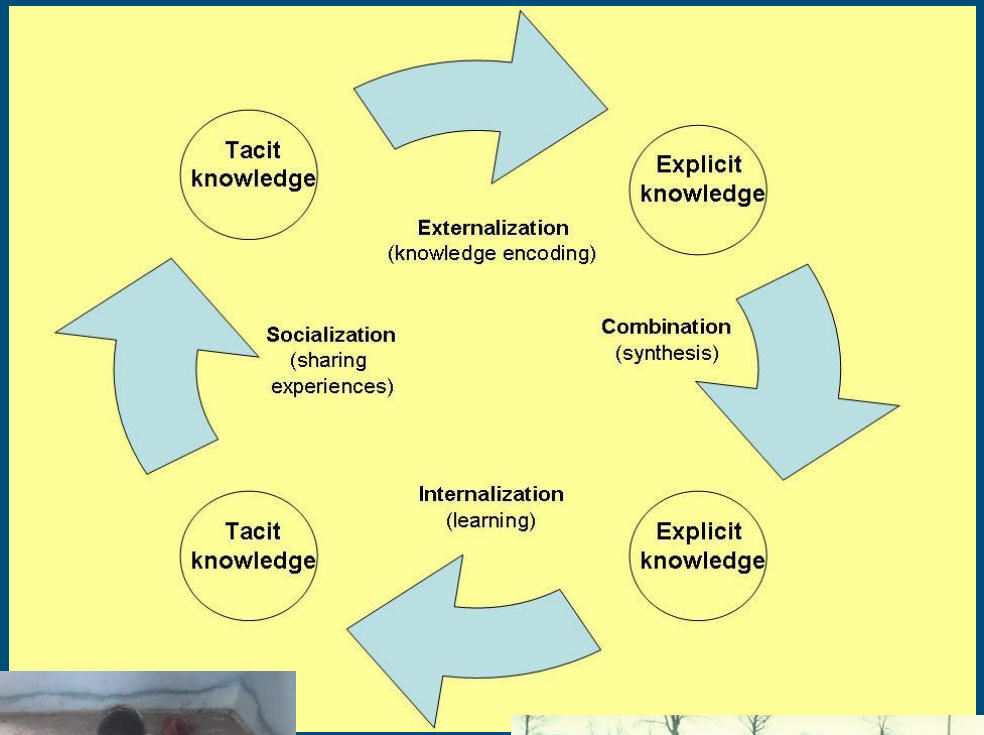
Ritzema et al., submitted

Case 7: An integrated approach in capacity development

Capacity development through long-term partnerships:

- Training & dissemination
- Egypt, India, Pakistan & SE-Asia

Capacity building is a never-ending process in which three elements, i.e. research, education and advisory services have to be applied in an integrated manner.



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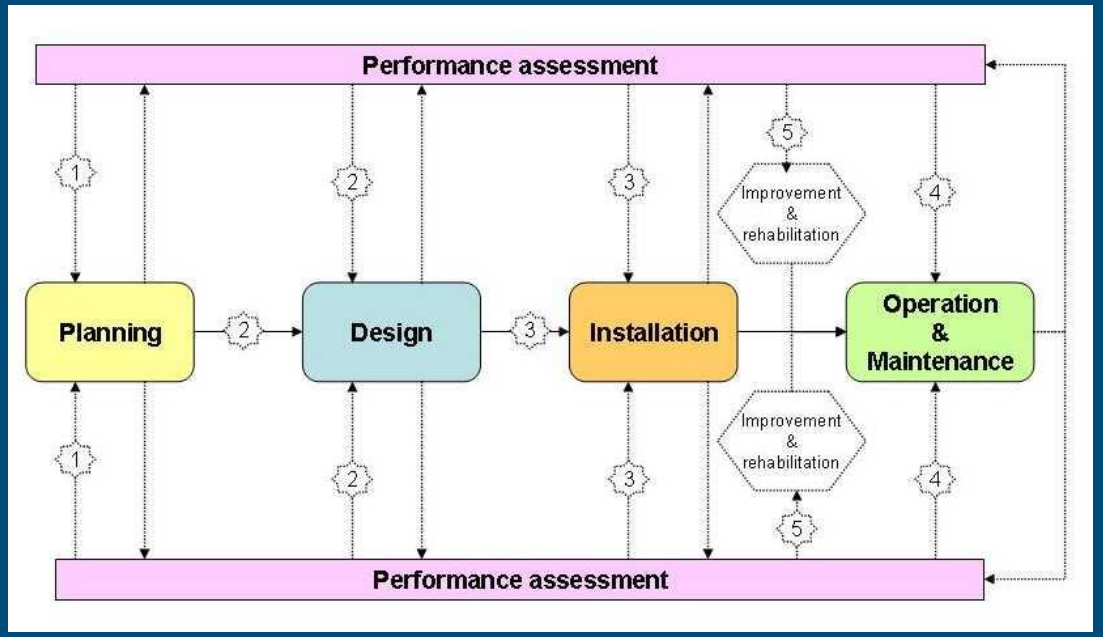
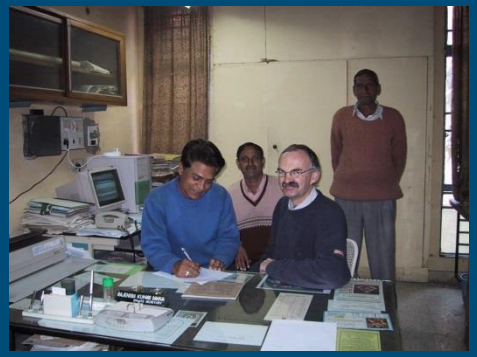
Ritzema et al., in press

Case 8: Added value of research

- Research programmes in Egypt, India and Pakistan.
- Research helped to modernize subsurface drainage practices
- Results: benefits of applied research easily outweigh the costs.





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Ritzema et al., 2007

Synthesis

- Cooperation with local research organisations/universities
- Problem-solving oriented
- Applied research
- Capacity building

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