

‘Damming water Supply’

A social - technical analysis of small recharge dams and their implications local community and basin

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(organizations, institutions, dams, local communities)

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Why this research

To explore the gaps between the development of the dams and their functioning within local communities and basin

Objectives of this research

- to examine the institutional context of dam implementation and groundwater resources in Sana'a basin
- to contribute to a better understanding of dam recharge at local level

Background

- Over usage groundwater
- Development of dams

Main research Question

- What is the organisational and institutional context of dam management and groundwater resources in Sana'a basin?
- Who benefits from the dam implementation?

Research Inputs

- WEC expertise

Lecturers & Students

-Literature Research

Library Water and Environment Centre WEC

Library of National Water Resources Authority NWRA

National Information Centre NIC

Arcadis & GDI & MWE

Research Inputs

- Interviews & Questionnaires & Group meetings
- Observations

During Interviews & Meetings

Attending other farmer meetings; Dhamar CWMP, Al Asha SBWMP, Sana'a wadi MENA

- Feedback from supervisors

Organizations & Institutions at basin level

Government bodies & institutions		Non Governmental Organisations	Water Resources Projects Yemen
Ministry of Water and Environment (MWE)	Ministry of Agriculture and Irrigation (MAI)	Agricultural Cooperative Union (ACU)	Sana'a Basin Water Management Project (SBWMP)
National Water Resources Authority (NWRA)	General Directorate of Irrigation (GDI)	Water Users Associations (WUA)	
Environmental Protection Agency			
Related Institutions			
Water Law No. 33	Agenda 21A 2000	Cooperative Law No. 39	
National Water Sector Strategy and Investment Plan 2005 -2009			

Chosen research areas:

Dams Constructed by farmers:

Arisha Qutran

Beryan (rebuilding by GDI)

Al Jarjor

Dam constructed by the GDI / ACU:

Musaibih & Al Halah



Chosen research areas:

Dams Constructed by farmers:

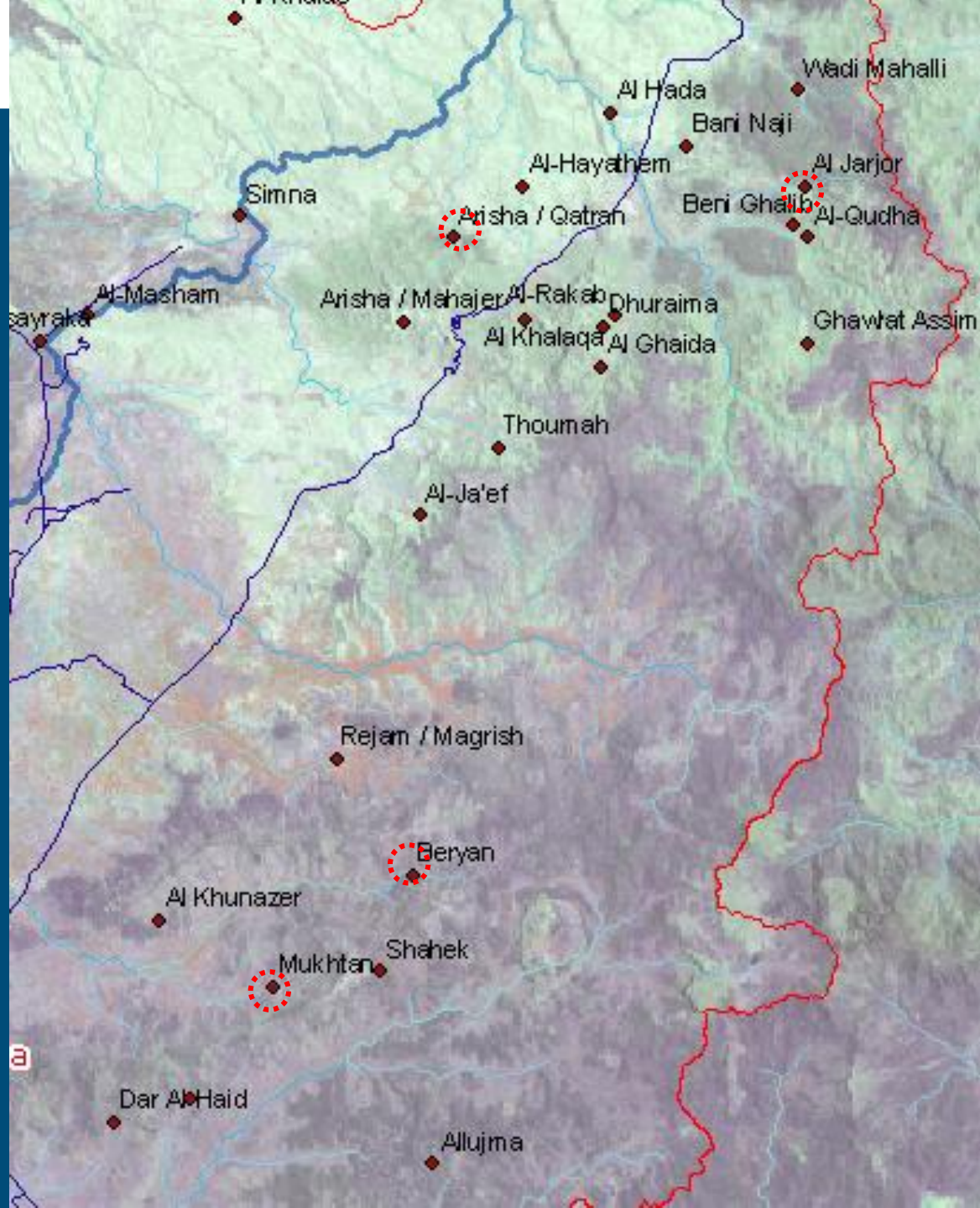
Arisha Qutran

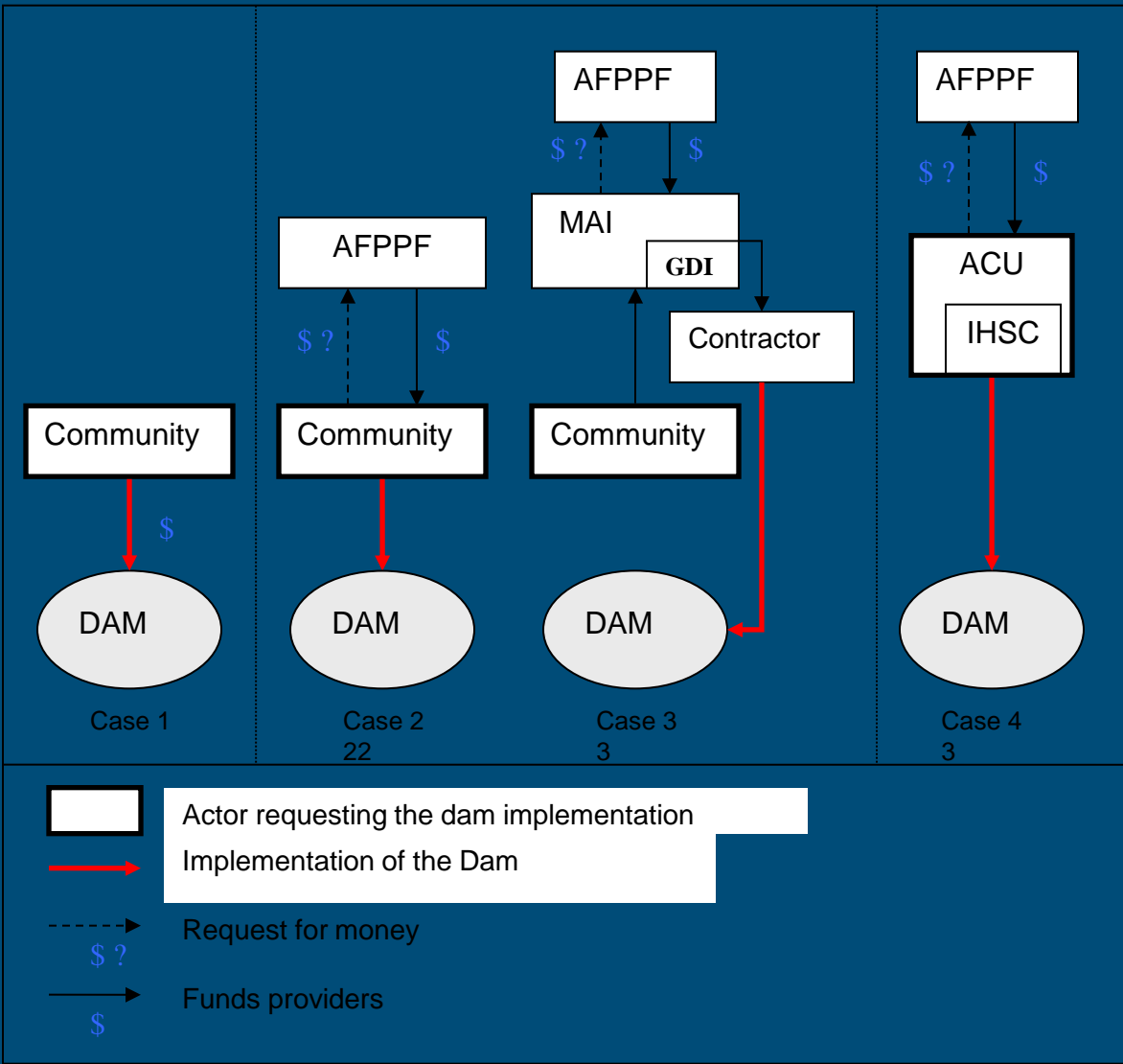
Beryan (rebuilding by GDI)

Al Jarjor

Dam constructed by the GDI / ACU:

Musaibih & Al Halah





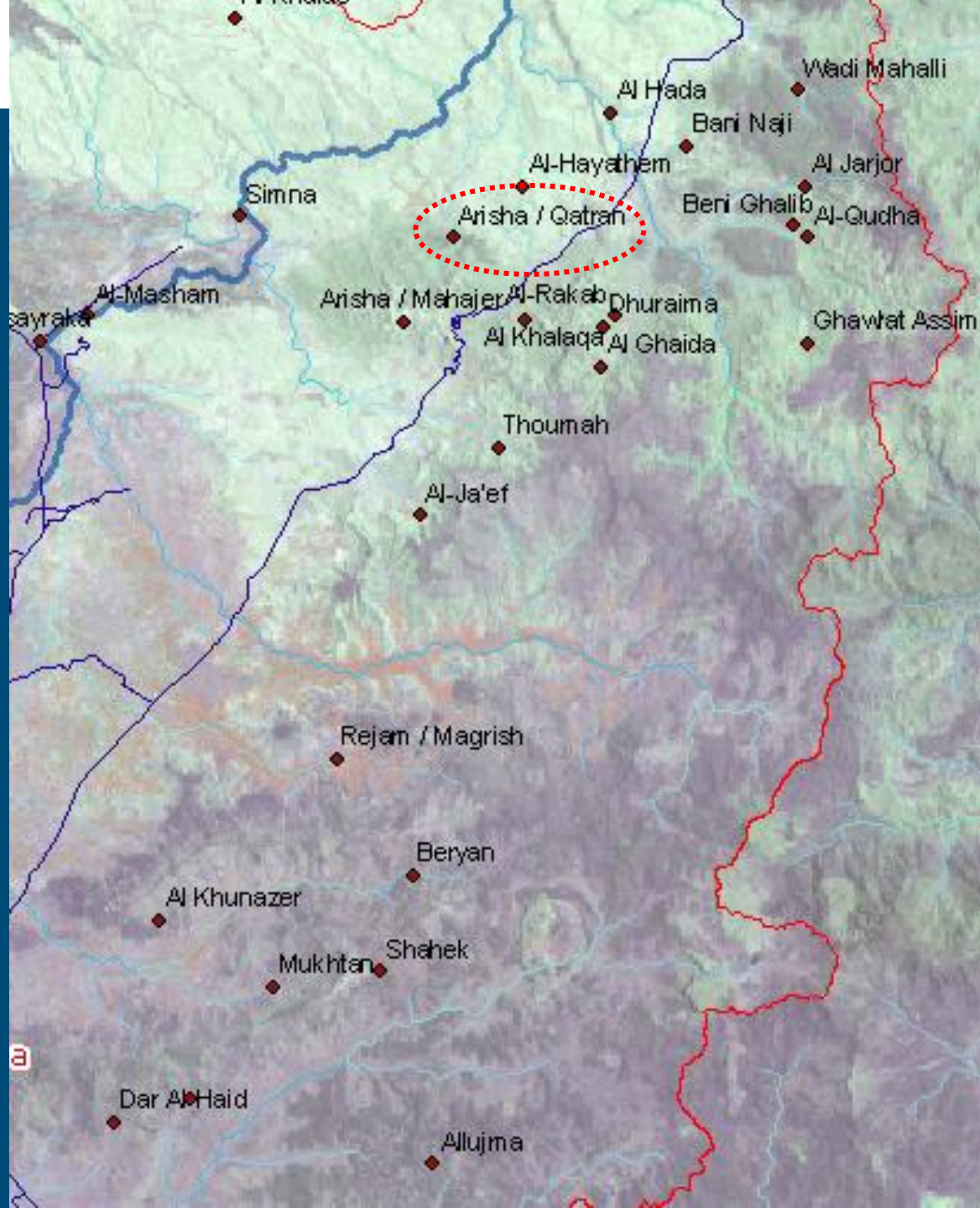
Describing the dams and the farming communities

	Year of completion	Building material	Height (m.)	Top width (m.)	Length (m.)	Catchment area (km ²)	Pumping costs YER/hr
Arisha Qutran	1997	Earthfill	13	9 - 25	400	6,45	163 - 430
Beryan	1997	Earthfill	25	10	223	10,325	500 - 1500
Al-Jarjor	1999	Earthfill	16	15,7	188	8,575	84 - 167
Al-Halah	1999	Earthfill	25	6,5	104	5,1	566 – 1020
Musaibih	2003	Masonry					566 - 1020

Describing the dams and the farming communities

Arisha Qutran dam

Wadi Araman



Describing the dams and the farming communities

Arisha Qutran dam

- Dam was a community investment (6million YER)
- Purpose recharge





Describing the dams and the farming communities

Arisha Qutran dam

- Dam was a community investment (6million YER)
- Purpose recharge

Farming communities





Describing the dams and the farming communities

Arisha Qutran dam

- Dam was a community investment (6million YER)
- Purpose recharge

Farming community

- Water distribution
- Crops (irrigated Qat & Corn, rainfed sorghum & barley)
- Ground water levels
- Water savings
- Maintenance (using the sediments)
- Water User Association

Describing the dams and the farming communities

Beryan dam

Wadi Beryan



Describing the dams and the farming communities

Beryan dam

- Community investment + AFPPF
- Purpose recharge for irrigation and domestic supply

Farming community



GWB26

Describing the dams and the farming communities

Beryan dam

- Community investment + AFPPF
- Purpose recharge + irrigation

Farming community

- Water distribution
- Crops (irrigated Qat & Grape)
- Ground water levels
- Water savings
- Maintenance (emergency lowering of the spillway)

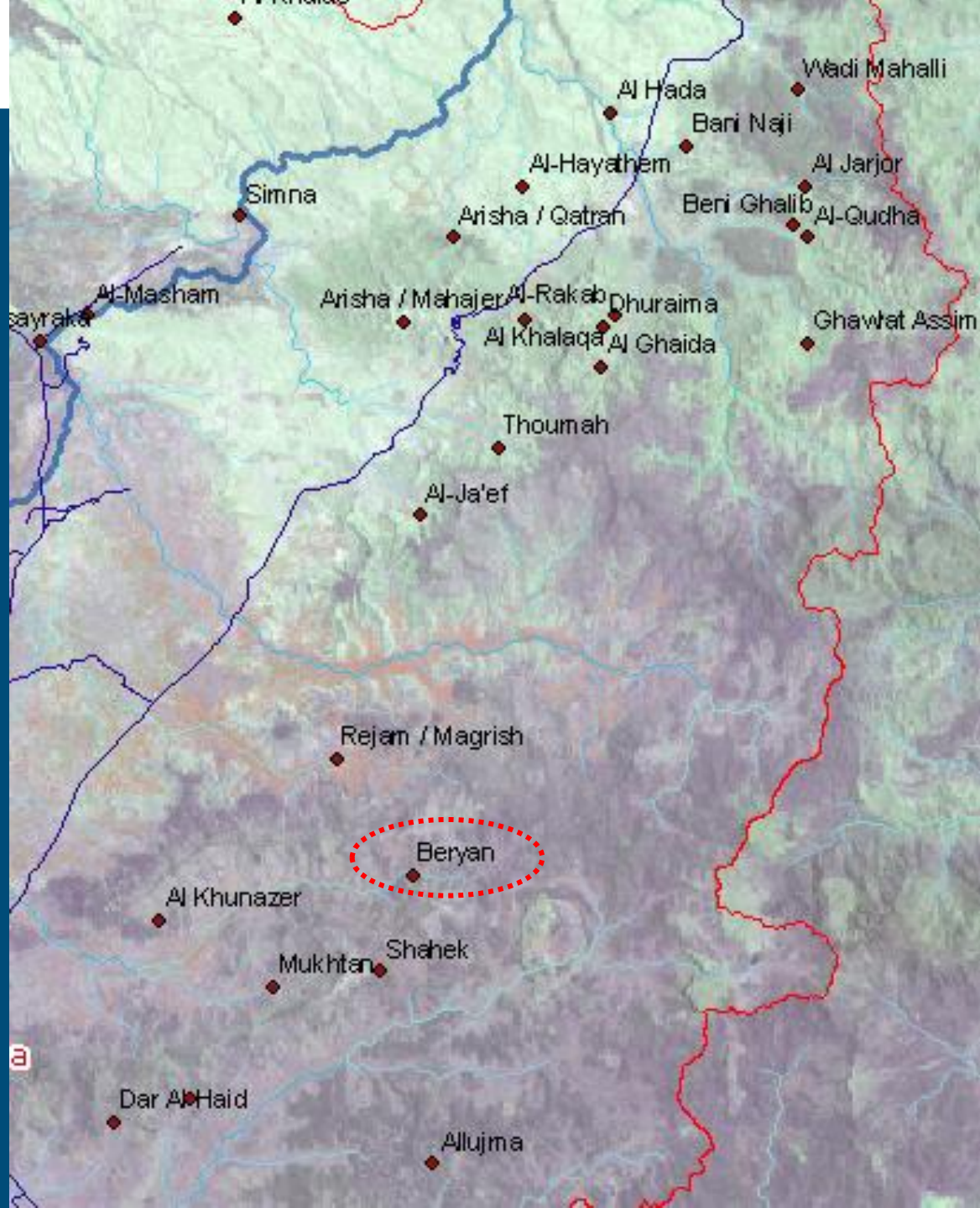
Water User Association

- 5 WUGs extent unknown
- Not everybody member (unknown benefit)
- Local rule of water sharing

Describing the dams and the farming communities

Al Jarjor dam

Wadi Uqran



Describing the dams and the farming communities

Al Jarjor dam

- Community investment + AFPPF
- Purpose recharge

Farming community







Describing the dams and the farming communities

Al Jarjor dam

- Community investment + AFPPF
- Purpose recharge

Farming community

- Water distribution
- Crops (irrigated Qat corn, rainfed sorghum, wheat & Barley)
- Ground water levels (10m. Drop / 10hrs pumping)
- Water savings
- Maintenance - none
- Buying of water 625YER/m³ or 3.14US\$/ m³ (irrigation of qat)

WUA

- None in place
- Expectancy SBWMP to instate for maintenance of the dam

Describing the dams and the farming communities

Al Halah & Musaibih
dams

Wadi Mukhtan







Describing the dams and the farming communities

Al-Halah & Musaibih dams in wadi Mukhtan

- GDI & General Irrigation Association
- Purpose both recharge

Farming community

- Water distribution

Crops (irrigated Qat, Grape, Peach, Apricot, Figs, Tomato, potato)

- Ground water levels (Tube wells constant, dug wells dry)
- Water savings
- Maintenance – none

WUA

- None but an agricultural cooperative (providing fertilizers, agricultural equipment and well drilling for all the farmers including non-members)

Research outcomes

Water law - function as base for the groundwater management instruments, authority to the organisations using them.

Only current organisational management form for sustainable groundwater use is through the communities as they hold the relevant instrument: the surface and groundwater use rights - customary (urf) and shari'a laws

Legal Pluralism

Research outcomes (cont'd)

- Dams built by communities (share owning)
- beneficial for community around or closest downstream (shared through intra-communal water distribution)
- recharge through raised groundwater levels in their dug wells

- Non – beneficial for communities downstream – no flood flow (spate & recharge of dugwells)

- the practices can be argued to be unsustainable within Sana'a basin

Research outcomes (cont'd)

- Organisational mismatch MWE and NWRA vs MAI, in principal working under the same law, but organisationally focused on demand management vs dam construction and irrigation (difficulties in execution large funded projects)
- Demand management (irrigation efficiencies – crop adaptability) vs the unsustainable amount of cropping area and the cultivation of crops which require a lot of water

Reference main report

- explanation of the organisations and their interplay (ministries, departments and local authorities)
- local and national ‘rules of the game’
- integration of studies both scientific as well as non-scientific
- extensive description of local communities (Nihm and Bani Hushaysh)

Putting ideas forward

- controlled releases of the dam (spate rules & recharge of dug wells, distribution network, multiple basins)

Note: rehabilitation, placement of valves (alternative operation) – infringement of water rights

- Involving Local People in Monitoring

Note: participatory hydrological monitoring - common local agenda on groundwater management

Putting ideas forward (cont'd) – shared responsibility

- Shift in subsidies, from pumping stimuli to fallow land / agricultural commodity (less $\text{m}^3/\text{ha}/\text{yr}$) subsidies
- focal shift from demand management to the unsustainable amount of cropping area and the cultivation of crops which require a lot of water

Future research agenda

Demand management and related policies

- Irrigation efficiencies: how efficient are the conveyance and application practices in Yemen (for certain crops e.g. qat and grape in Sana'a basin): Shedding light over the confusing and conflictive accounts within literature, with field data and research
- Demand management: How can a demand management approach be sustained if the irrigation efficiencies already seem to be close to optimal? Alternative cropping and reduction of cropping area. (I
- Sana'a basin plan, combining water accounting with landuse and alternatives (economically attractive for agricultural sector

Future research agenda (cont'd)

Water distribution in communities

- Water distribution agreements within a community; how is water shared, amongst shareholders
- Water distribution agreements within a community; how are the benefits of recharge from a dam distributed within a community (does one benefit more than others), what are the internal mechanisms of sharing water, How was the locations of a dam decided within a community

Institutional / Organisational Policy

- Irrigation water within the MAI or the MWE: Irrigation as water or an act of Agriculturalists

Thank you

Farmers

Government Agencies

Water and Environment Centre, Sana'a
University (staff and students)

Wageningen University

Time for:

Questions, Comments

