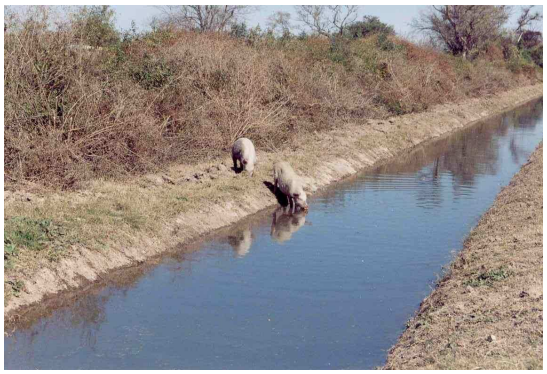

CT4410 Design assignment 2010-2011

A list with 'what to do and/or answer'

Design a gravity irrigation system

Issue 1: Water demand versus water availability

Demand: is determined by
Crop(s)
Cropping pattern(s)

Soil preparation (basically bringing soil up to field capacity)

Availability: is determined by
Rainfall – which part is effective???
Surface water flow – low flows, average flows, high flows? Frequencies?
Groundwater – how much recharge? (not in this design exercise)

Timing of the demand Options for adapting to availability

Timing of availability Options for storage?

This results in:

Amount of hectares to be irrigated
Associated risk in balancing demand and availability

Issue 2: Bringing water to the field(s)

- Continuously?
  - 24 hours a day to one field, to a group of fields?
- Rotation?
  - 24 hours a day? Only during the day? 7 days a week? Fixed turns, days, hours?
- What flow is available for farmers?

Issue 3: Grouping farmers (?)

Issue 4: Who decides?

- Water delivery
  - Demand-based, request-based, supply-based?
- Upstream or downstream control?
- Delivery and response times?

Issue 5: Water control structures

- Discharge control?
- Measurement?
- Fixed or adjustable?
- Sensitivity?

Issue 6: Are you sure things will happen as you designed them to happen??

Data design assignment CT4410

Crops

The system needs to deliver water for the following crops:

Crop	*Mean surface area (% of total)*	*Growing period*
Cotton	30	Oktober/November – March/April
Mais	40	February – Oktober
Vegetables	30	March – June
Rice	0	December – April

Crop water requirements will be given during class.

Typical field size

One farmer can irrigate about 1 hectare.

Soil

Silty loam, with groundwater tables at least 3 meters below the surface.

Climate

	Mean rainfall	*Min rainfall*	*Max temp*	*Min temp*	*Humidity*	*Wind speed*	*Sunshine*
	mm	mm	C^o	C^o	%	Km/hr	Hrs
Jan	118	75	35.1	19.5	65	10	8
Feb	107	50	33	18.6	70	9	7.4
Mar	80	34	30.1	16.7	72	8	6.1
Apr	49	23	26.5	12.5	74	8	5.6
May	30	0	23.1	9.7	81	7	5.5
Jun	15	0	20	7.0	83	7	4.1
Jul	10	0	21	4.8	74	8	5.8
Aug	15	0	23.9	6.5	64	10	6.9
Sep	36	0	27	10.2	58	12	6.8
Oct	46	12	29.9	13.9	59	12	7.2
Nov	75	56	32.2	16.6	62	12	7.6
Dec	125	101	34.6	19	61	10	8.1
Average	59	30	28	12.9	68.6	9	6.6

Maximum rainfall event: 100 mm in 2 hours

Available water in the river in m^3/s

	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
Mean	4	2	1.5	0.3	0.2	0.2	0.1	0.1	0.1	0.8	1.6	1.5
Max	8	5	5	2	1	1	0.5	0.5	0.5	3	4	4
Min	2	1	1	0.2	0	0	0	0	0	0.5	0.6	1
