Irrigation design

Irrigation and Drainage
CT4410

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Most of you worked a little mechanical on the irrigation needs. Looking at these from a slightly bigger distance shows that we have a cropping pattern that can be sustained on pre-sowing gifts and some additional irrigation later in the cropping cycle. Basically, in fall, things may become a little tricky. The rhythm of the cropping pattern suggests that you are dealing with an irrigation system that needs to give supplemental water, in addition to rainfall. The pre-sowing gift is likely to be one of the more important irrigation turns to consider.

Another issue is how to deal with water needs and water availability. Quite a few of you seem to confuse supply and demand management – which is a way to organize water allocation and distribution – with upstream of downstream control – which are hydraulic terms. I can have demand management with upstream control.

Most of you show what the systems will look like. Not that many can clearly tell me what the system is supposed to do. I have not really seen any sensible arrangement of how water needs, water supply, canals and units are linked in terms of water quantities and timing of irrigation turns.

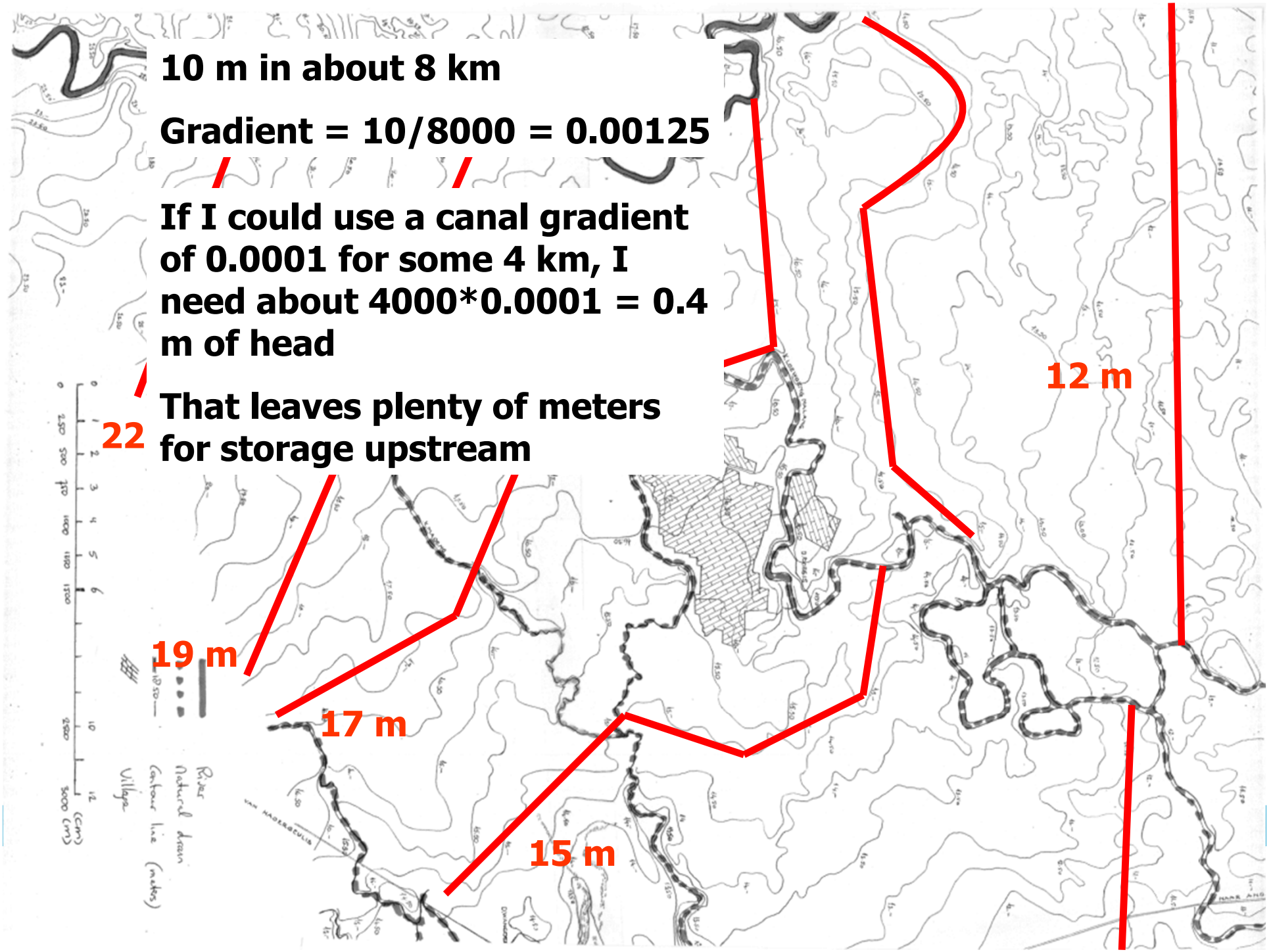
As your system needs to work in all kind of circumstances, you cannot base your design on a typical organizational model. Yet, you have to design a system with flows and controls, which is obviously somehow connected to an organizational model. A way to deal with this paradox is make it very clear what actions are needed in your system to ensure the functioning of the system. When should structures be opened or closed, that kind of issues. Who opens or closes them is almost irrelevant.

I have seen many different layouts, and with all of them I am not sure that you have the required head loss available to irrigate all fields. You need to check much more carefully whether the available energy levels and gradients allow the designs you want.

Delivering water in a gravity system is a combination of

- Matching needs with availability
- Thinking of a smart irrigation rhythm
- Think of control actions and structures
- Fit the infrastructure in the topography

Linking water needs and water availability typically could be arranged with two strategies. Either one aims to ensure that the correct flow is on the correct place at the correct time – this requires pretty precise water control – or one ensures that the correct amount can be drawn on (almost) any place at the time needed, which decouples main system supply and water use. Obviously, storage will be needed between main system and water use.


10 m in about 8 km
Gradient = 10/8000 = 0.00125
If I could use a canal gradient of 0.0001 for some 4 km, I need about 4000*0.0001 = 0.4 m of head
That leaves plenty of meters for storage upstream
22
19 m
17 m
15 m
12 m