Opportunities and Threats of Irrigation Development in Kenya's Drylands

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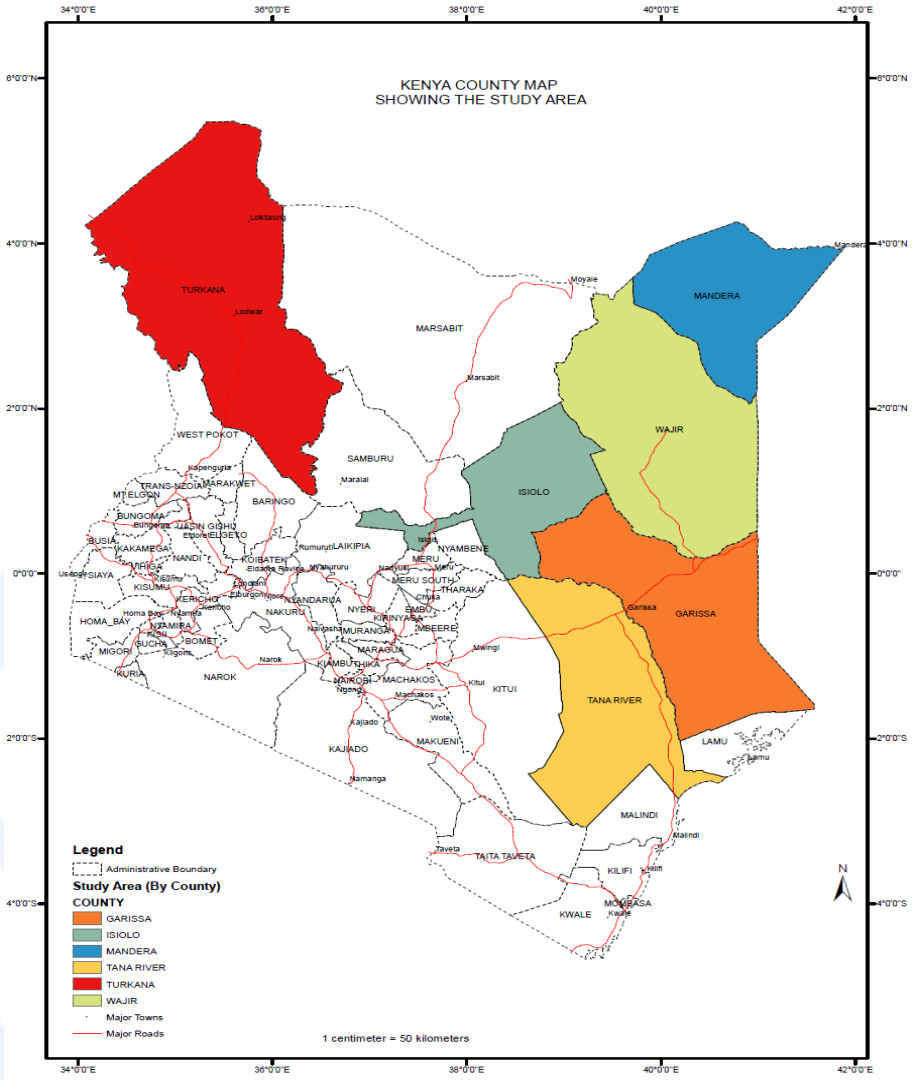
Funded by EU

KENYA REPRESENTATION

Introduction- Why the Study?

- Increasing interest in irrigation development in drylands- feasibility, implementation, expansion & rehabilitation
- Assess opportunities of irrigation development in drylands
- Potential impacts of irrigation development to drylands ecosystems, pastoral communities & their traditional livelihoods
- Inform planning and interventions

Where?



Kenya's Drylands (some)

- Basins: Daua, Tana, Turkwel, Kerio & Ewaso Ng'iro North river basins
- Merti Aquifer

6 Arid Counties:

- Turkana, Wajir, Mandera, Isiolo, Garissa and Tana River
- Merti Aquifer

Why?

Most irrigation development/expansion in the drylands ("free" land); fragile; socio-economics/cultural issues

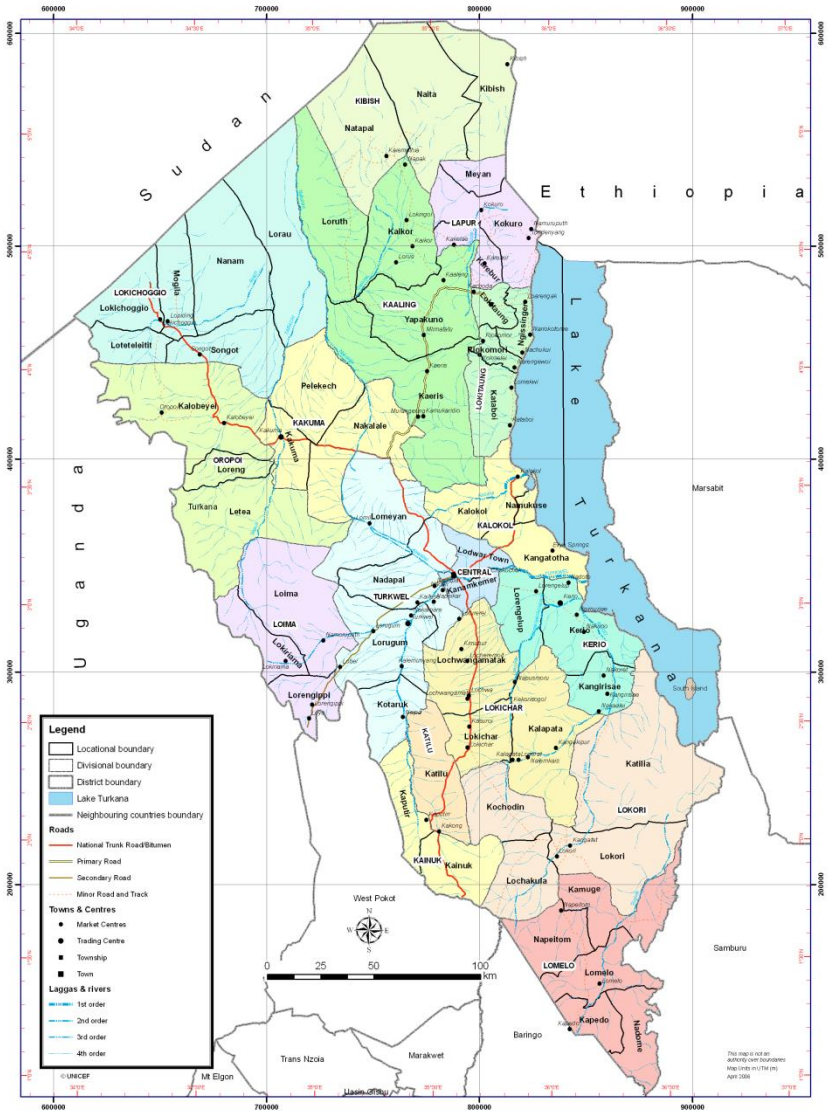
How it Was Done?

- Mainly undertaken through literature review
- Field observations and interviews

Reports:

- The main report summarizes the findings of the study counties and the Merti aquifer
- Details of counties & Merti aquifer are presented as 7 separate volumes

Turkana Findings: Main Water Resources



- Current: Turkwel (15 m^3/s) & Kerio (10.5 m^3/s). Assume ½ will be committed domestic, livestock and other ecological functions

- In September 2013, a hydro-geological survey commissioned by UNESCO revealed existence of vast deposits of fresh ground water in the county estimated at 250 billion cubic meters, and naturally replenished at the rate of about 3.4 billion cubic meters per year.

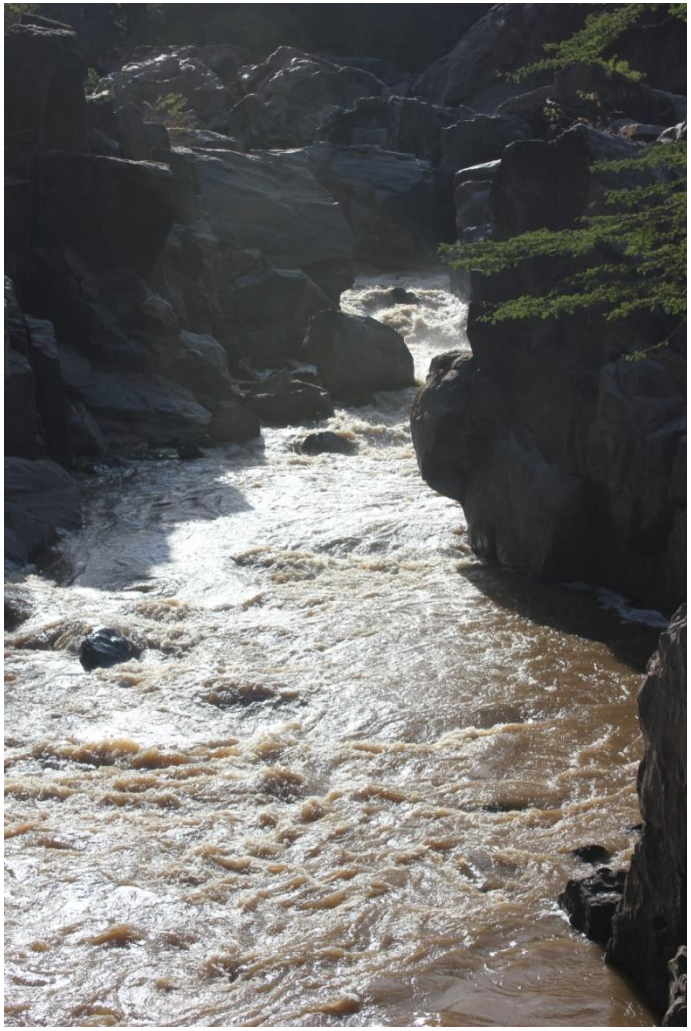
Definitions

Physical irrigation potential

Based on: water resources (balance without storage), soils & irrigation water requirements (cropping & climate)

Actual irrigation potential

Factors in environmental & socio-economic constraints



Actual Irrigation Potential

	Area under irrigation (ha)	Irrigation potential (ha)
Turkana	2,666	16,600

Currently (2,666 ha):

- Schemes producing: 12,035 metric tons of grain/yr.
- The schemes are supporting: 16,609 households
- Plot sizes: 0.15 to 0.4 ha

Food Security

Potentially (16,600 ha):

- Grain production may increase to 232,615.8 metric tons- 2 crops/yr
- Estimated that Turkana food requirement for the population of 855,399 people is between 106,000-117,000 metric tons out of which 25% is provided through famine relief
  - Irrigated areas better- only 10-15% of population under relief. (county – 45-50%)
- potential yield of crop residues will be four times the yield of grain and it amounts to 930,463.2 metric tons
- The crop residue can provide low quality feed to 399,340 tropical livestock units (with 4,980 ha of fodder)

Cost- Development, O&M & Cost Recovery

- Assuming 14,000 ha and 2,600 ha are irrigated via gravity fed surface and pump fed overhead systems respectively, total cost for implementing 16,600 ha will be about KSh. 12.14 billion.
- Costs annualized over 30 years the annual costs per hectare would amount to KSh. 44,900. If O&M costs alone were to be recovered, the annual costs would be approximately KSh. 20,500 per ha.
- Costs annualized over 5 yrs, costs per ha would amount to KSh. 155,000 for total cost recovery; KSh. 140,000 will comprise recovery of capital costs.
- If O&M costs recovered, the annual costs would be approximately KSh. 15,000/ha or KSh. 7,500/ha per season.

Income

Annual Revenues

Currently:

Estimated average at **KSh. 145.6 million** from food crops or KSh. 54,895/ha/yr (could be less). O&M and total cost recovery- KSh. 155,000/ha/yr annualized over 5 years period. Estimated average household income is KSh. 8,700/ha/yr.

This is an indication that the beneficiaries cannot sustain the project on their own without subsidy which supports why most of the smallholder irrigation schemes in dry areas have collapsed.

Potential:

If the total irrigation potential was to be developed, and two seasons cropped, the total net revenues would increase to **KSh. 2,609,619,600**. The quantities produced will increase significantly in areas under irrigated production. Average revenue will be KSh. 120,928/ha/yr.

Key Negative Environmental Impacts

- Hydrological alteration
- Soil erosion including river bank erosion
- Water quality degradation
- Vegetation disturbance e.g. *Hyphaene thebaica* (Doum palm) & *A. Tortilis*
- Impact on wildlife
- Water-borne and water related diseases
- Soil salinization
- Land and water resource use conflicts-forced displacement/resettlement
- **Loss of dry season grazing and access to rivers**
- Prosopis invasion

Opportunities

- Increased crop production through intensification and opening up new Land
- Crop diversification and improved cropping patterns
- Increased food security
- Increased fodder production
- Fall back for the households that loose livestock
- Improved household incomes
- Exploitation of newly found aquifer for irrigation

Good Practices

- Integrating livestock into irrigation
- Commercialization of irrigation incl. contract farming
- Soil and water conservation
- Efficient water use

Major Threats and Challenges

- Seasonality and changing course of rivers
- Flooding
- Siltation/high silt load
- Land degradation and salinization
- Prosopis invasion- could be an opportunity?
- **Loss of dry season grazing**
- Communal land tenure
- Inadequate market system
- Limited technical capacity and extension services
- Subsistence nature of irrigation
- Operation, maintenance and sustainability of irrigation projects in drylands
- Insecurity
- Policy, &legal challenges
- Economics of crop irrigated agriculture vs pastoralism in drylands

Recommendations

- Water Harvesting and Storage needed for irrigation development
- Establishment and maintenance of hydrological data for planning
- Incorporate flood protection in design to secure investment
- Commercialization of irrigation to ensure sustainability
- Integrated development planning particularly livestock component-fodder, crop residues; land use planning to minimize conflicts
- Strengthening capacities of local communities
- Implement good irrigation practices to minimize land degradation
- Further study on the benefit-cost ratio between irrigation and livestock production
- Explore exploitation of the newly found aquifers for irrigation development
- Environmental Impact Assessment and Monitoring to ensure environmental sustainability

Thank you

http://coin.fao.org/cms/world/kenya

http://www.fao.org/index_en.htm

http://www.countrystat.org